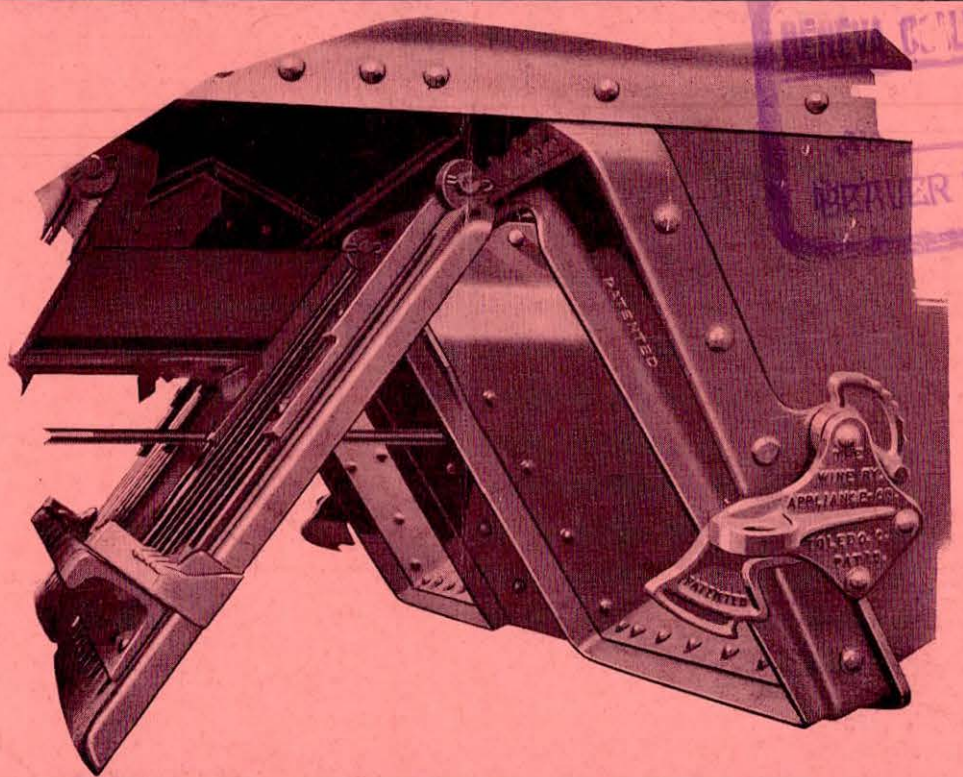
AUGUST 15, 1931

Railway Age

Founded In 1856

WINE HOPPER FRAMES
AND
DROP DOOR LOCKS
INSURE
TIGHT DOORS



A
CONSTRUCTION
THAT WILL HAUL
PREPARED COAL
WITHOUT LOSS

The Wine Railway Appliance Co.
TOLEDO, OHIO

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Buyers Directory of Advertisers—Page 55

THE DIFFERENCE
is in the
Production

International's operating policy is vastly different from that prevailing in the tie industry. It gives *International* ties the distinction of superiority in quality—service—value.

International Ties are manufactured from sound timber in strict accordance with the A.R.E.A. Specifications. Important is the fact that all *International* Ties are removed quickly from the decay producing condition of the woods, transported to the right-of-way where they are stacked in open formation and high from the ground.

Here they are inspected, graded and then promptly shipped to specially prepared and tile-drained seasoning yards which are kept free from all vegetation.

This careful supervision of ties immediately after they are cut assures the soundness and longevity of *International* Ties.

Contract Now for Future Delivery.

International

CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF HIGH GRADE TREATED TIES

Galveston *Beaumont* *Texarkana*

From tree to track, thoroughness dominates every detail of International production.

3¢1 The International Dating Nail

This dating nail is your assurance that the tie is a Standard A.R.E.A. Specification Tie.

Full Size
Sound Timber
Properly Seasoned
Scientifically Treated

Published weekly by Simmons Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa. Entered as second class matter, March 9, 1928, at the Post Office at East Stroudsburg, Pa., under the act of March 3, 1879.
Address communications to 30 Church St., New York City.

EFFECTING ECONOMIES by MODERN METHODS

MODERN steam locomotives are masterpieces of engineering skill. Restricted in size, self-contained, subjected to severe vibration and torsion, capable of moving thousands of tons at either a snail's pace or passenger train speed; and withall, displaying remarkable operating economies.

When these modern locomotives drawing heavy loads are stopped, even infrequently during a trip in order that passing siding switches may be hand operated or that meets may be effected, their output is materially reduced.

Realize the greatest possible output of these modern transportation plants by the extensive installation of G-R-S Centralized Traffic Control. A comprehensive study will reveal the economic necessity of this system between many points for reducing operating costs to a minimum. A representative installation of this modern G-R-S System shows a 39% increase in the G.T.M. per Train Hour, a 36% increase in the average train speed, and the institution of non-stop meets; with a 24% annual return on the investment, over and above interest charges, or 65% on the investment when postponement of construction of a second main track is considered.

You, too, can secure similar results on your line. Our series of GRS folders are yours for the asking.

GENERAL RAILWAY SIGNAL COMPANY

ROCHESTER, N. Y.

New York Chicago St. Louis A-850

Affiliated Companies' Offices: Montreal London Paris Tokyo Barcelona Melbourne Calcutta Buenos Aires

Lewis Special Hollow Staybolts

Railroads specifying Lewis Special Hollow Staybolts realize the value of pure pig iron properly worked. They realize the high uniform quality of this product which enables locomotives to go further without staybolt replacements.

Lewis Staybolts withstand the terrific strains in locomotive service longer because of the careful selection of pure pig iron and the unvarying process of manufacture. Only iron of known analysis is used. It is hand puddled, thoroughly worked and double refined. Dependable workmanship in every step of this special process assures, long, rope-like fibre—a tough uniform iron from end to end.

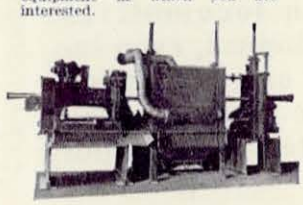
Lewis Special Hollow Staybolts Conform to A.S.T.M. Specifications A-84-27, Grade A.

Active manufacture and development of Lewis Special over many years is rewarded by its ever increasing use among the railroads of the Nation.

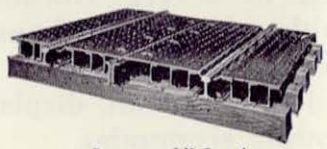
If you are not already specifying Lewis, send for samples to test. Furnished headed, threaded, or headed and threaded from Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Philadelphia, Jersey City or Boston.

Railroad Machinery

Ryerson Flue Shop and Spring Shop Equipment is reducing costs in many large railway shops. Ryerson Machinery also includes rail reclamation plants as well as standard machine tools and metal working equipment of all kinds. Write for catalog and complete information on the equipment in which you are interested.



Sand Blast Flue Cleaner



Ryerson All-Steel Highway Crossing

An all-steel highway crossing which combines sturdiness with simplicity of construction. It will withstand the heaviest traffic almost indefinitely. Easily installed; four men can put in an eight-foot section, ready for traffic, in less than half an hour. A smooth, safe crossing which is rapidly gaining prestige with railroad maintenance men. Write for Bulletin, giving complete information.

RYERSON

RAILROAD-SERVICE

Published every Saturday by the Simmons-Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa., with executive offices at 30 Church Street, New York

All communications should be addressed to the New York Office 30 Church Street

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With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office

Vol. 91 August 15, 1931 No. 7

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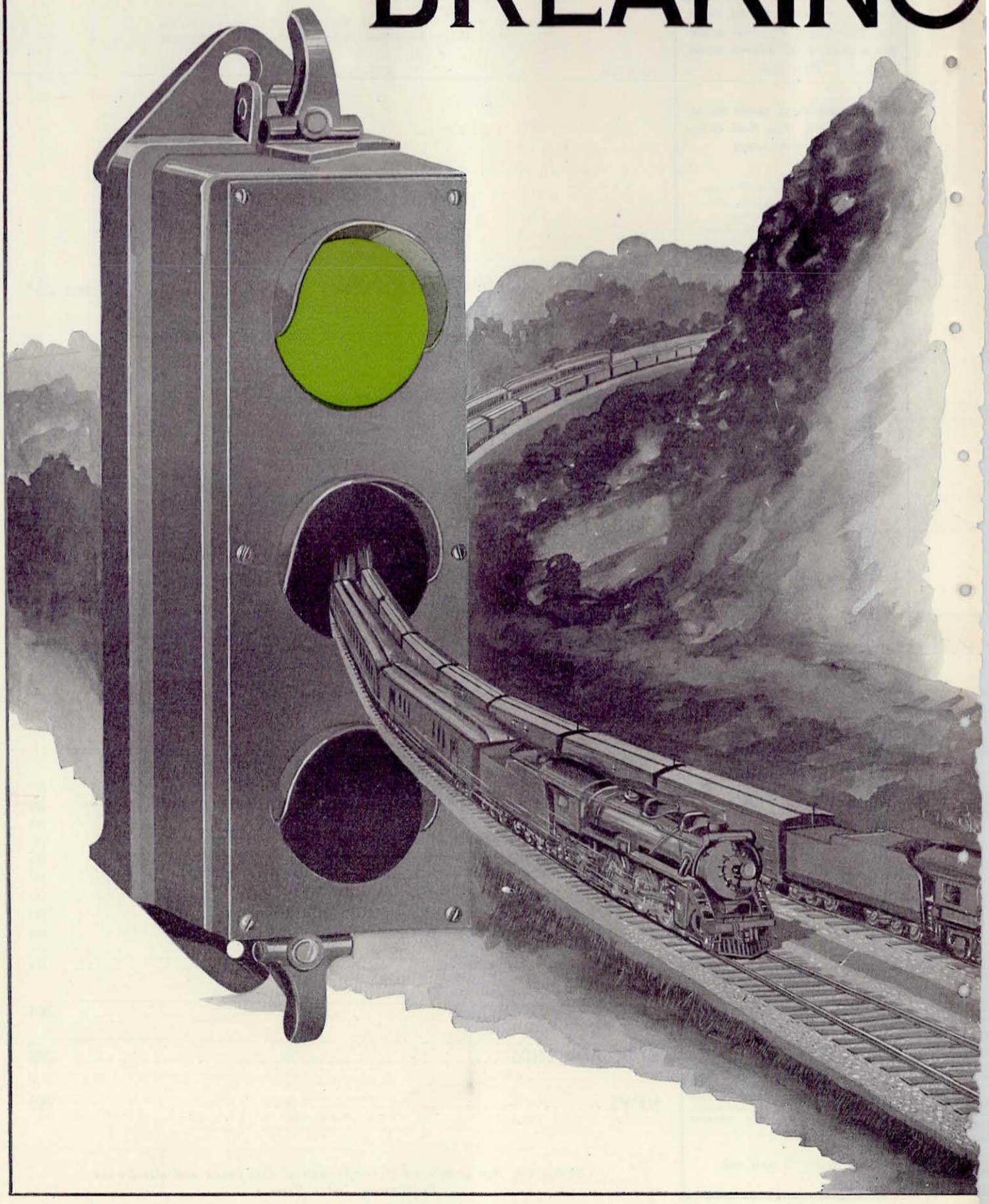
BREAKING



THROUGH !

RECENTLY the entire east coast was suffering from fog and storm. One large railroad was able to operate all trains on a certain division *on time*, when practically every other road in the vicinity was encountering serious delays. "Union" Continuous Cab Signals enabled them to *break through* on that division!

This is but one instance in which Cab Signals enabled the maintaining of fast, reliable and safe freight and passenger schedules.

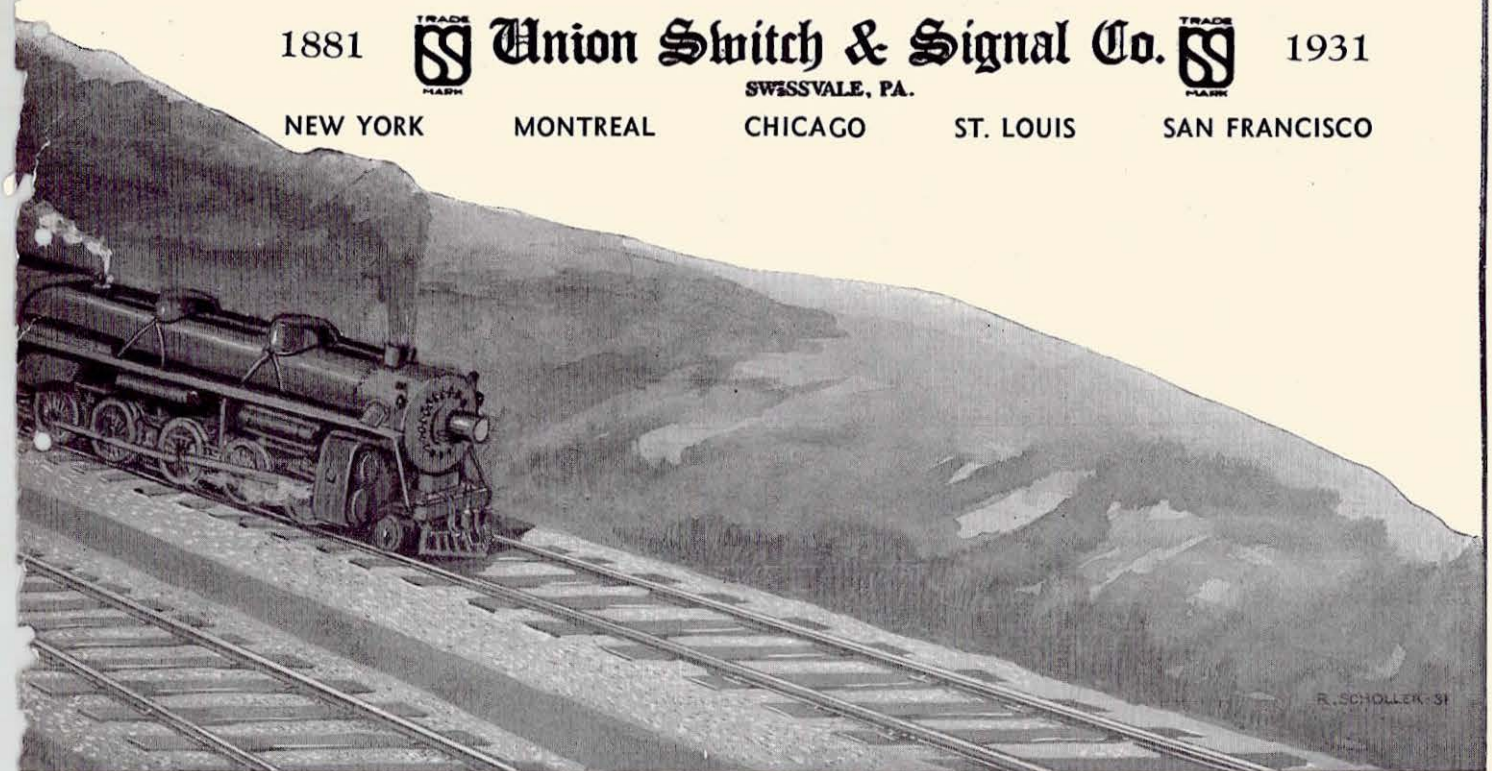
The improved operating conditions and economy universally derived from installation of "Union" Continuous Cab Signals have resulted in users *breaking through* with (a) increased speed, due to the uninterrupted service irrespective of the elements; (b) reduction in number of train stops; (c) reduction in crew overtime due to faster operation; (d) increased train loads due to fewer stops and improved signaling; (e) fewer hot boxes, burned wrist pins and lower locomotive maintenance costs; (f) increased morale of engine crew; and many other advantages.

May we consult with you on your traffic and signaling problems? Write our nearest district office.

1881 Union Switch & Signal Co. 1931

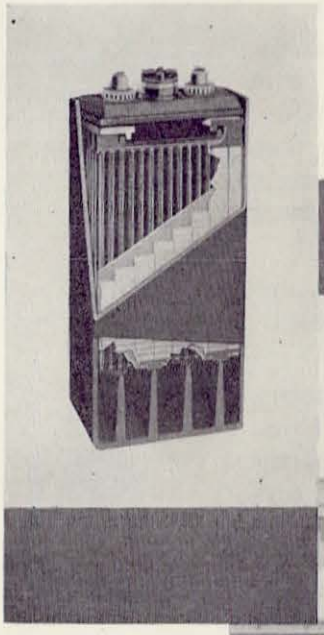
SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO



POWER COMPANY ADDS NEW MONEY-SAVER

New 50-ton locomotive for the Texas Power & Light Company is equipped with 200-cell Exide-Ironclad Battery



Exide-Ironclad cell, cut away to show rugged construction.

50 TONS OF DOLLAR SAVING. This switching locomotive is powered with a 200-cell Exide-Ironclad Battery, Type MVA-31. A locomotive like this can save you money too.

Day in, day out, this locomotive rides the rails . . . switching tons of material with speed and economy. And should reserve power be needed for extra heavy loads, the Exide-Ironclad with which it is equipped is there with plenty of it.

The Texas Power & Light Company has used a 25-ton Exide-Ironclad-equipped locomotive for over four years. So satisfactorily did it prove its ability to save time and money for this company, they have now added this powerful, new 50-ton locomotive. An unusual feature of these two locomotives, which may well be adopted, is: the battery trays, cells and motors are interchangeable.

Here are ten reasons why the Texas Power & Light Company have two Exide-Ironclad-equipped locomotives in their service:

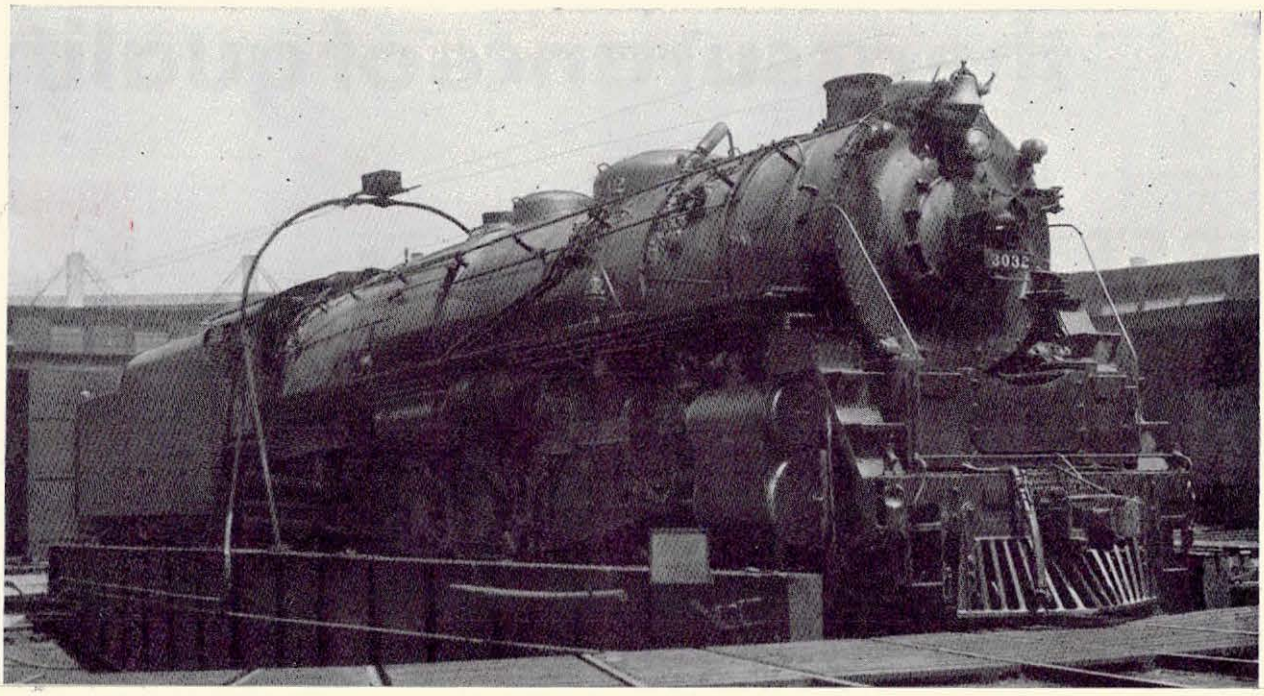
1—They do away with costly track electrification and trolley troubles.
2—Supply a switching service that withstands the most gruelling railroad conditions.
3—Clean, silent operation.
4—No sparks, smoke or fumes, thus permitting their use in buildings.
5—Reduced maintenance costs due to fewer moving parts.
6—Power consumed only when in operation.
7—Large momentary overload capacity.
8—Operated safely and efficiently by one man.
9—Perfect, simple system of control.
10—Ready for instant use.

Exide
IRONCLAD
BATTERIES

If you have a switching job in or about your plant, a storage battery locomotive equipped with an Exide-Ironclad battery will serve to excellent advantage. Write for further facts. Investigate the advantages of storage battery locomotives. There is no obligation.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE
Exide Batteries of Canada, Limited, Toronto

Modern Power Saves Fuel



MOTIVE power modernization today offers the most attractive field for increasing operating efficiency.

The strictly modern power now in operation on many railroads has not only brought the greatest benefits to shippers, but has also been responsible for further substantial savings in fuel.

The year 1930, according to statistics recently compiled, showed new and gratifying fuel consumption records. In freight service, the coal consumption per thousand ton-miles, including locomotive and tender, was 121 pounds—a reduction of 4 pounds as compared with the best previous record established in 1929. In passenger service the fuel consumption per car-mile was 14.7 pounds as compared to 14.9 pounds during the previous year.

Further fuel savings will be effected for the railroads by replacing, with strictly modern power, many of the 48,000 locomotives now in service which are more than ten years old. The latter locomotives are unable to show the high efficiency of the latest designs.

We have cooperated with many important railroads in designing and building locomotives which make possible these benefits.

THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE
BALDWIN
LOCOMOTIVE WORKS
PHILADELPHIA

...that industry may enjoy the assurance of quality

FIRST . . . *unproved values*

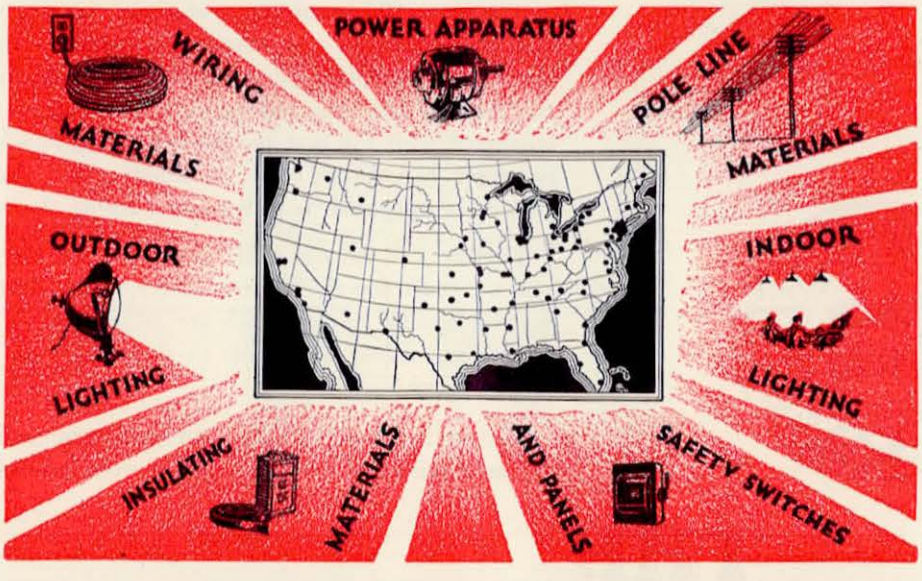
by salesmen for an infant industry.

THEN . . . *dependable products*

but distributed through uncoordinated channels.

NOW . . . *unquestioned quality*

in a complete line of electric apparatus and supplies, quickly available from more than 80 wholesale warehouses, strategically located throughout the United States... All to the end that Industry may enjoy service with the assurance of quality.

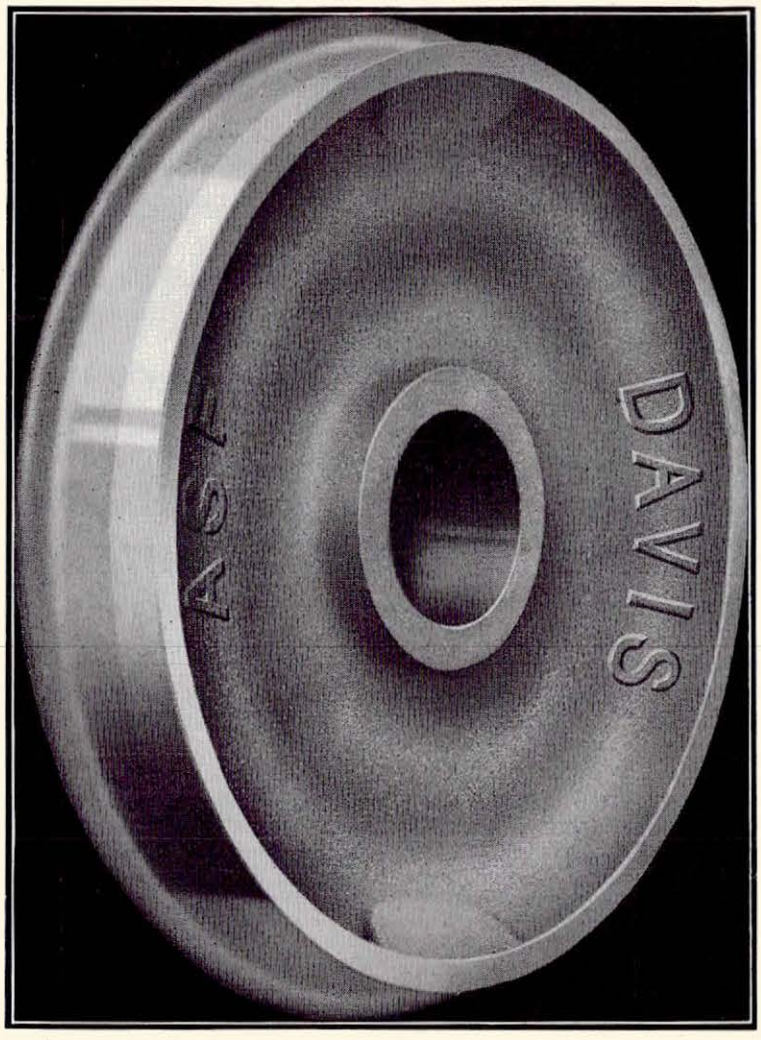


You can obtain prompt delivery of everything electrical *from a General Electric Supply Corporation wholesale warehouse near you.*

GENERAL ELECTRIC

SUPPLY CORPORATION

DAVIS "ONE-WEAR" STEEL WHEELS



WHY PERPETUATE AVOIDABLE REPAIR WORK?

Here is an unnecessary job that grows larger every year - wheel conditioning . . . . . .

Wheels that seek the shop for re-turning occupy the time of men and machinery unnecessarily . . . . . .

Davis "One-Wear" Wheels go through life causing no trouble, only asking to be left alone . . . . . .

Their special composition steel, triple heat treated, will abolish maintenance work . . . . . .

Use Davis "One-Wear" Steel Wheels for relief from maintenance . . . . . .

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Select Your Roof Deck Today for it's *Economy!*

The more you investigate and compare roof materials, the more convinced you will become that there is *one* basic material which stands out sharply because of its *greater value:*

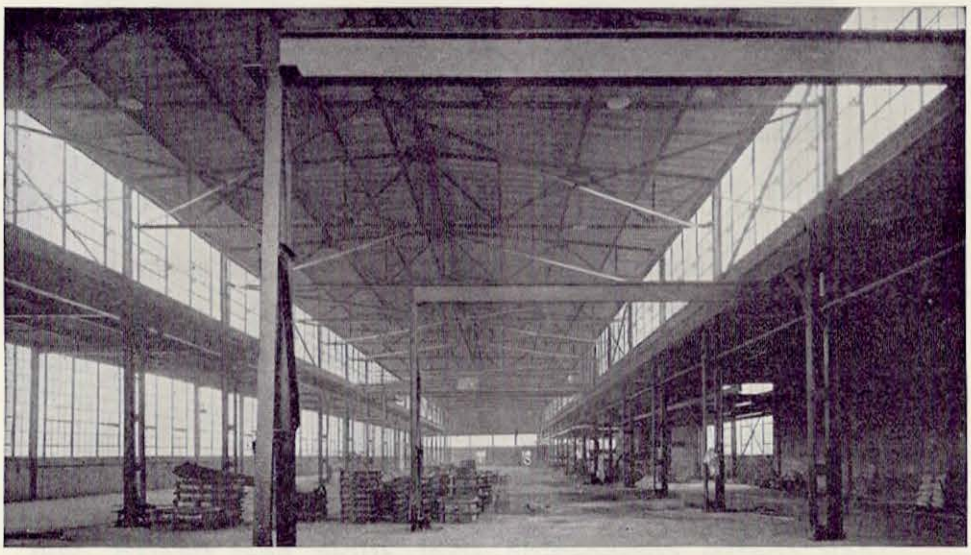
- - greater value because it saves structural steel tonnage
- - greater value because it requires no maintenance expense
- - greater value because it is fireproof
- - greater value because of its insulating qualities
- - greater value because it lasts indefinitely.

This material is in the form of

Featherweight Concrete INSULATING ROOF SLABS

—made of Haydite aggregate instead of sand, and weighing as low as 10 lbs. per sq. ft. They go on the same light steel frame that carries other roofs.

Millions of square feet are giving perfect service today on buildings of all kinds —industrial, utility, railroad and public. Our quarter century of experience can help you save money on your own roof projects. Send for "Catalog and Roof Standards".



Columbia Radiator Corp., McKeesport, Pa., Gray Iron Foundry, covered with Featherweight Concrete Insulating Roof Slabs.

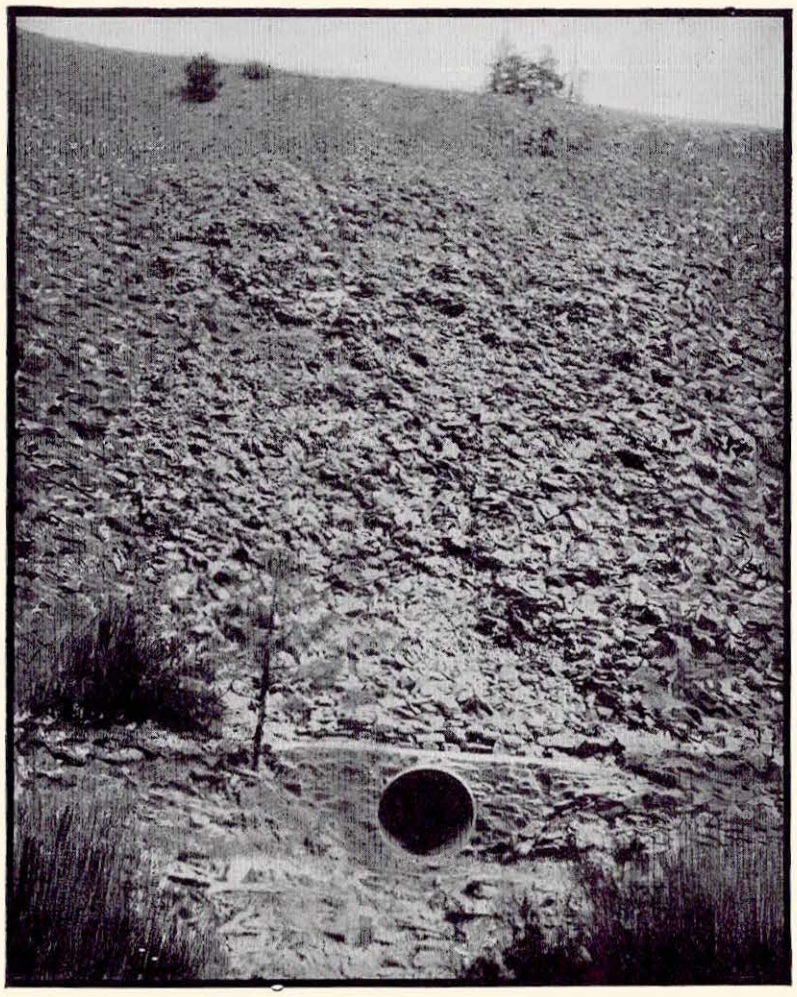
These slabs make the most satisfactory foundry roof available because they are immune to heat, fumes and gases.

Made, Laid and Guaranteed by

FEDERAL-AMERICAN CEMENT TILE CO.

Executive Offices: 608 South Dearborn Street - - - - - - - Chicago
Plants near CHICAGO · NEW YORK · PITTSBURGH · BIRMINGHAM
FOR OVER A QUARTER CENTURY

25 years of Service to date . . . the unequaled Record of ARMCO Culverts



This 60-inch Armco Culvert has been giving satisfactory service under a 56-foot rock fill in California since 1920.

ON this record of service under America's railroads you may choose with confidence culverts of pure iron Armco Corrugated Pipe. Their longer life means greater economy for you.

Officially, by the test of time, Nature has OK'd Armco Culverts as the longest lasting product of its kind in use.

Since 1906, Armco Culverts have satisfactorily served the railroads of America, keeping the roadbeds dry, firm and safe for heavy, fast moving traffic.

Factual data on the use of Armco Culverts under various railroad conditions will be sent on request.

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand.

ARMCO

ARMCO CULVERT MANUFACTURERS ASSOCIATION

Middletown, Ohio

Courtesy of Chesapeake & Ohio Railway Co.

Comfort above when trains are

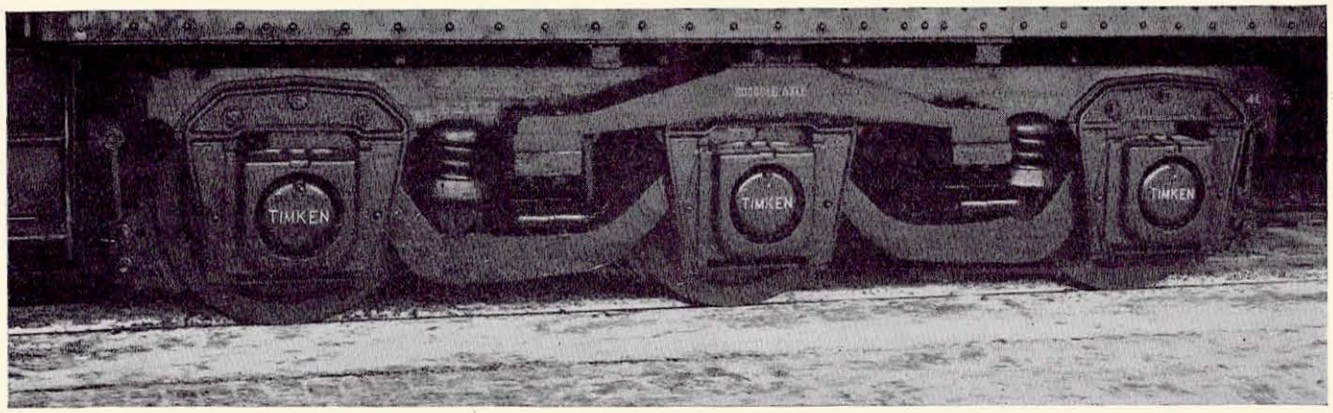
TIMKEN Tapered Roller

dependability below Timken Bearing Equipped

Within the cars—jerkless, joltless, smooth *restful* riding; contented passengers. Below—in the trucks—freedom from hot boxes and incidental delays; increased "on time" performance; decreased operating and maintenance costs.

Modern trains operating on Timken Bearings have raised the standard of railroad travel in comfort, speed and dependability. Starting resistance is decreased 88%. Longer trains are handled on faster schedules. Longer non-stop runs are successfully accomplished.

Transportation must be sold in competition now-a-days. Roller bearing trains constitute one of the most effective sales aids railroads can have. The Timken Roller Bearing Company, Canton, Ohio.



BEARINGS

"I lay much of my success to the fact that I'm a spendthrift"

says a famous industrialist!

"I'VE never been afraid," says a noted American industrial leader, "to spend money in order to save money. Some of my competitors think me a spendthrift in this respect, yet I never fail to get back many times what I invest for the sake of greater efficiency."

That this view is shared by many progressive railroad officials is evidenced by their adoption of Teletype, the machine that sends typewriting by wire. Already such roads as the New York Central, Pennsylvania, Southern Pacific, Illinois Central, Union Pacific, Santa Fe, Baltimore & Ohio, Rock Island and Burlington have found that it repays its cost again and again through its more efficient handling of wire detail.

For example, one road reports that by installing $9,000 worth of Teletype equipment it is saving approximately $12,000 a year. Another states that its Teletype installation paid for itself in less than three years' time, while still another advises that Teletype is saving it in excess of $110,000 annually!

Perhaps the most notable economy was that effected by a well-known western road. It saved a 4,500 mile circuit between San Francisco and New York, and in addition substantially reduced operating expenses because of Teletype's greater capacity.

In view of money-saving achievements such as these, don't you feel that you owe it to yourself to learn more about what an investment in Teletype might accomplish toward shaving the operating costs of your road? Investigation will convince you that it is without equal, particularly from the standpoint of economy, for general message traffic, for handling train announcements in terminals, for dispatching information from yard offices to switch towers, for reporting car arrivals to trace bureaus, and for sending consists, wheel reports and car diversion orders.

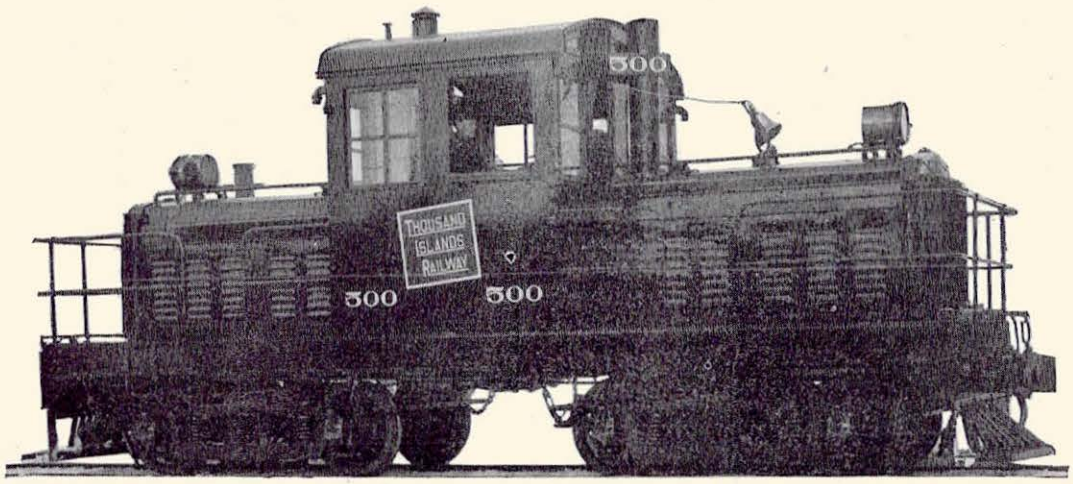
Operated just like a typewriter, Teletype sends typewritten messages over either telegraph or telephone wires. It can be duplexed or multiplexed to transmit two to eight messages over the same circuit at the same time. For further information write the Teletype Corporation, 1400 Wrightwood Ave., Chicago.

TELETYPE

SUBSIDIARY OF

Western Electric Company

"Saving well over 50% for the year". . . .



A DUAL power-plant 40-ton gas-electric Whitcomb Locomotive, specially designed for Canadian National Railways, and being operated by their subsidiary The "Thousand Island Railway," is keeping up the Whitcomb tradition for high standards of performance.

Operating between Gananoque and Gananoque Junction, a distance of five miles, making seven round trips every twenty-four hours, this locomotive, hauling an average of 238 tons, is building a reputation for efficiency, flexibility and unusual economy.

Like all standard and special Whitcombs, this locomotive provides an ample margin of both speed and tractive effort without in any way overloading the engine. Ease of control and high visibility greatly increase operative proficiency.

Reports from an official of Canadian National Railways, state; " . . . continuity of operation with little mechanical trouble can be confidently expected . . . operating cost would indicate a saving of well over 50% for the year as compared with the previous steam operation."

Whitcomb Locomotives, full mechanical drive, oil-electric and Diesel type, offer distinct advantages in switching and short line operations. For details inquire of the factory, at Rochelle.

THE WHITCOMB LOCOMOTIVE COMPANY

WHITCOMB LOCOMOTIVES

ROCHELLE
ILLINOIS

In Bridge or Road-Bed Inland Steel "Keeps Faith"

Save with Steel

INLAND STEEL

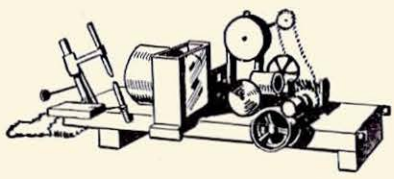
RAILS
ANGLE SPLICE BARS
TIE PLATES
TRACK BOLTS
TRACK SPIKES
SHEETS
BARS
BANDS
STRUCTURALS
PLATES
RIVETS
BILLETS
PILING

TOO much emphasis cannot be placed on the importance of the great railroad bridges which span dizzy depths. Here strength and safety are paramount and here Inland Steel plays its part. In no less degree Inland Rails and Track Accessories are found "keeping faith" on the road-beds of the great systems of the Central West.

Inland has accepted the responsibilities attached to producing steel for railroad applications. And every Inland worker realizes his personal share of the obligation. This watchful care of individuals combined with the best production facilities obtainable, and exacting scientific tests at every step from mine to finished product has built Inland's standing as a producer of steel that "keeps faith." INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago, Illinois.

INLAND
ABLE SERVANT OF THE CENTRAL WEST
STEEL

RAILS THAT KEEP FAITH



When C. Francis Jenkins, inventor of the modern motion picture, gave the world its first public demonstration at Richmond, Indiana in June 1894, the Dearborn Laboratories had already been in operation for seven years. These laboratories have continued their work daily since that time, increasing boiler efficiency through scientific correction of harmful tendencies in the water.

Economical..... Steam Production

Begins in the Laboratory

...and is maintained..... ..... under laboratory control

Elimination of scale formation, foaming, pitting and corrosion in locomotive boilers begins in the laboratory. It is made possible only through accurate mineral analysis of the water. This analysis enables our chemical engineers to supply treatment that is 100% effective in overcoming the troublesome and costly tendencies. In its thoroughness as well as its low cost lies the economy of Dearborn Treatment.

Any method which supplies only partial correction of these harmful tendencies, falls short of the maximum economies which Dearborn scientific methods produce.

Determining nitrates and total solids in water supplies

Softening systems remove part of the scale-forming salts, but the remainder concentrate and slowly deposit in the boilers. The salts used in softening stimulate foaming. Dissolved oxygen which accelerates corrosion, is not removed in softening.

In many cases where softeners are used, Dearborn Treatment is being employed to complete the correction of the water. Softening systems represent a substantial investment while superior results are produced through Dearborn methods, with only small investment in treating equipment.

Dearborn laboratory control makes good results continuous—whenever any variation in the water supply occurs, water samples are sent to the laboratories and the treatment is adjusted as required. Thus, users of Dearborn Treatment are assured of freedom from water troubles at all times.

This is the reason many railroads throughout the world rely upon Dearborn service in water correction.

If you are not using Dearborn Treatment, investigate. Interesting comparative data is available. Write us, describing your operating conditions and send us gallon samples of your water supplies for analysis and recommendation which will be made without charge.

DEARBORN CHEMICAL COMPANY

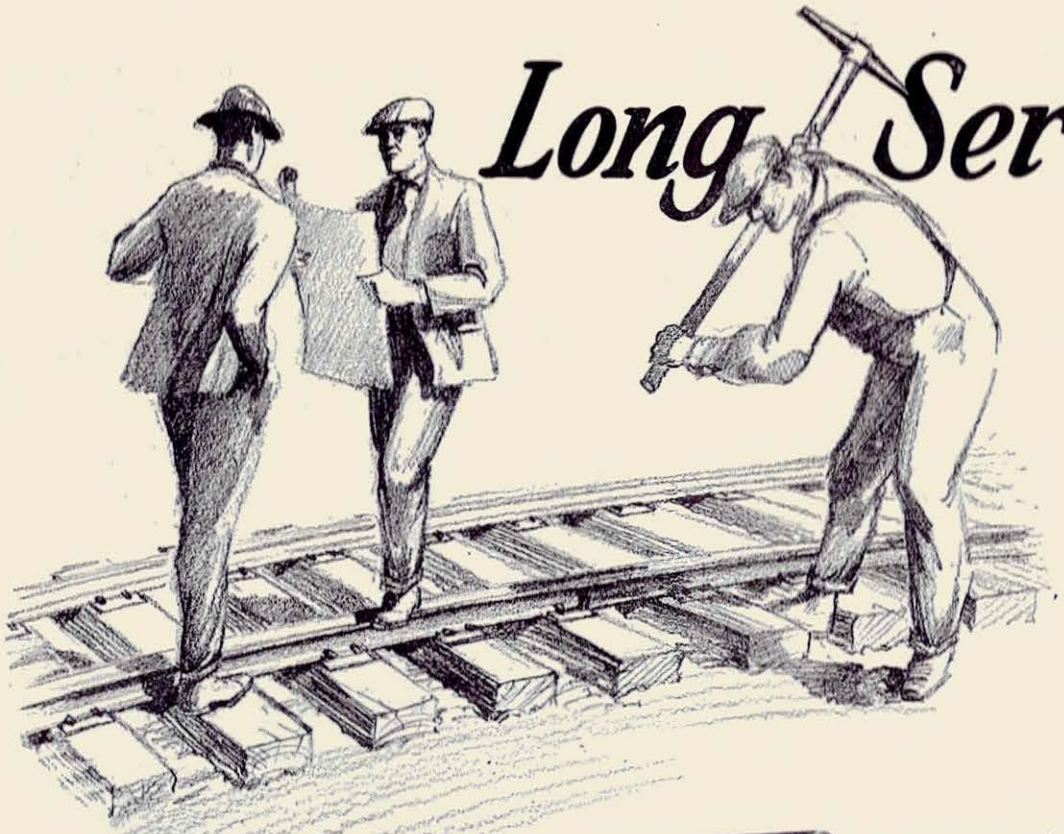
310 S. Michigan Avenue, CHICAGO 205 E. 42nd Street, NEW YORK

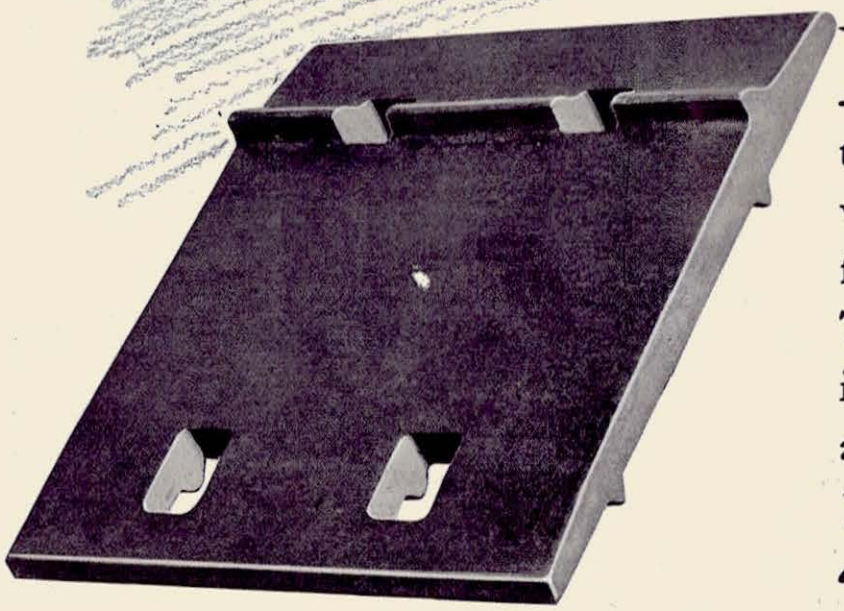
Canadian Office and Factory: TORONTO

Dearborn

TRADE MARK REGISTERED

Long Service!





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Subsidiary of United States Steel Corporation

General Offices: Brown-Marx Building, Birmingham, Alabama

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2243

—*Birdsboro steel castings on ten new Reading locomotives . . .*

Constructed by a prominent locomotive builder for the Reading Company, these ten K-1, Santa Fe, 2-10-2 type engines are illustrative of true economic design and engineering principle.

Of the 2243 steel castings—by Birdsboro—that entered their assemblage, all main frames, back frames, crossheads, crosshead gibs and driving wheel centers were cast of 30 steel—that copper-moly alloy of Birdsboro perfection that has reduced failure in service to naught.

Your locomotive vitals deserve the appointments of a high strength, corrosion-fatigue resisting alloy . . . You get these features when specifying Birdsboro-30.

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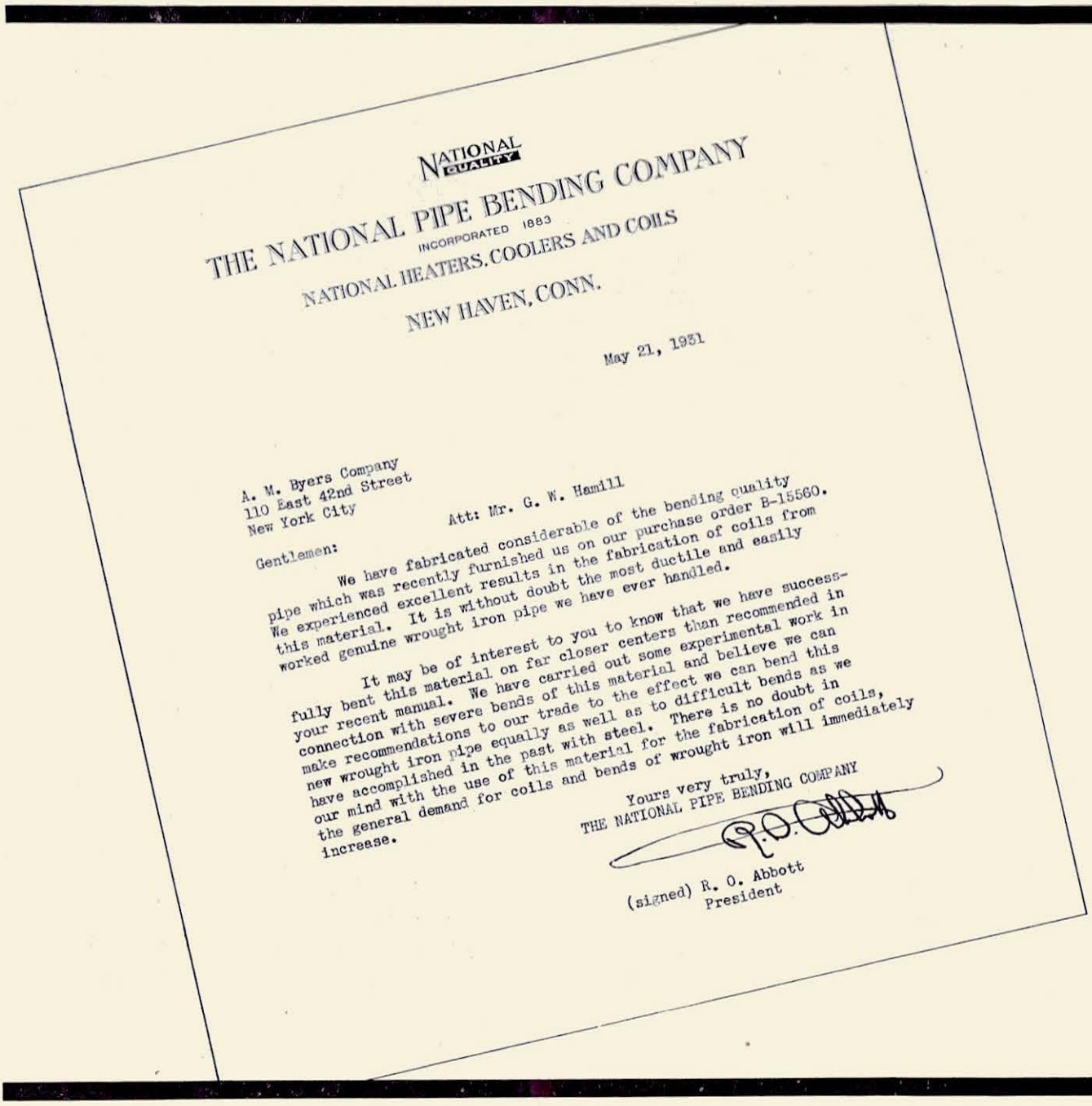

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INCORPORATED 1883
NATIONAL HEATERS, COOLERS AND COILS
NEW HAVEN, CONN.

May 21, 1931

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Att: Mr. G. W. Hamill

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Yours very truly,
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(signed) R. O. Abbott
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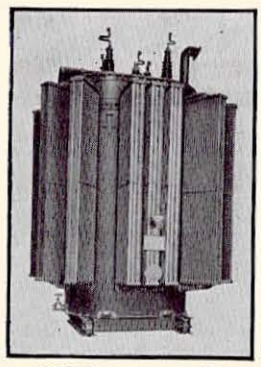
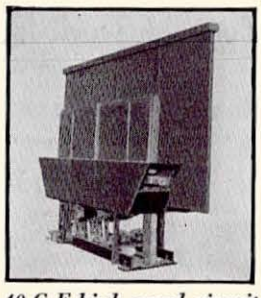


Three 8000-kv-a. transformers



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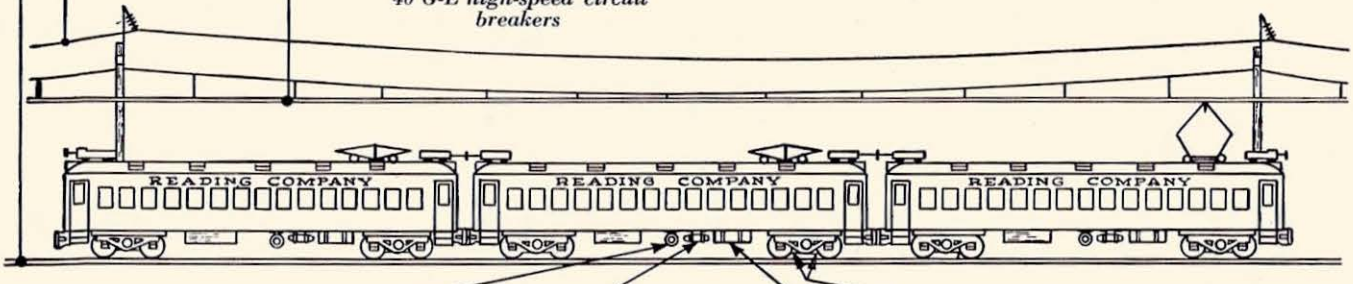

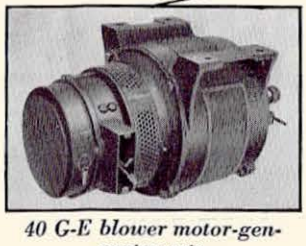

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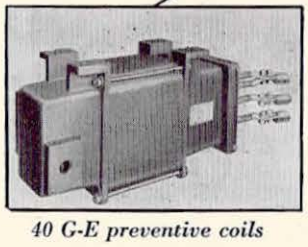
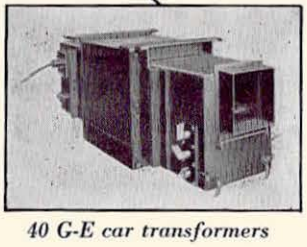
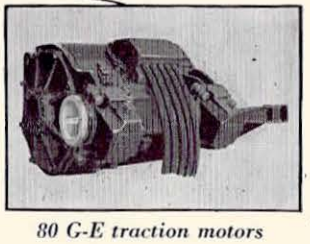


40 G-E preventive coils



40 G-E car transformers



80 G-E traction motors

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Commonwealth
STRAIGHT EQUALIZER SWING MOTION TRUCKS
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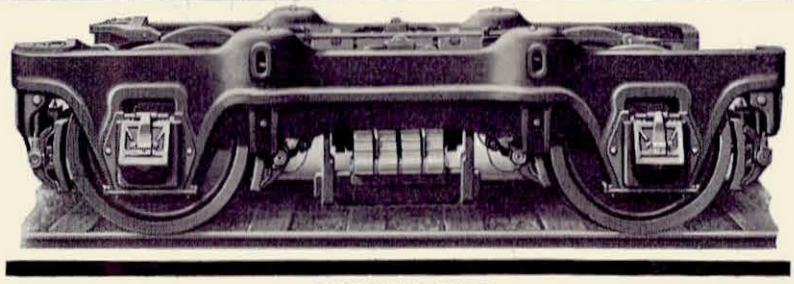

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Truck Frame Including Pedestals a Strong One-Piece Steel Casting.

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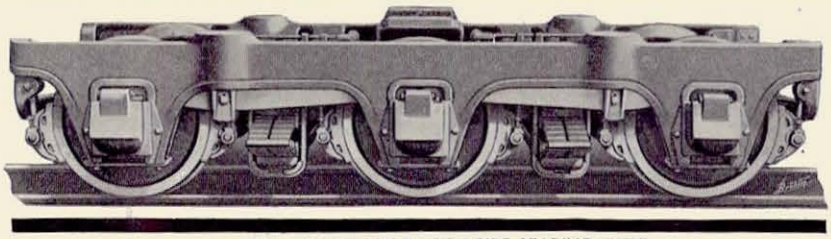

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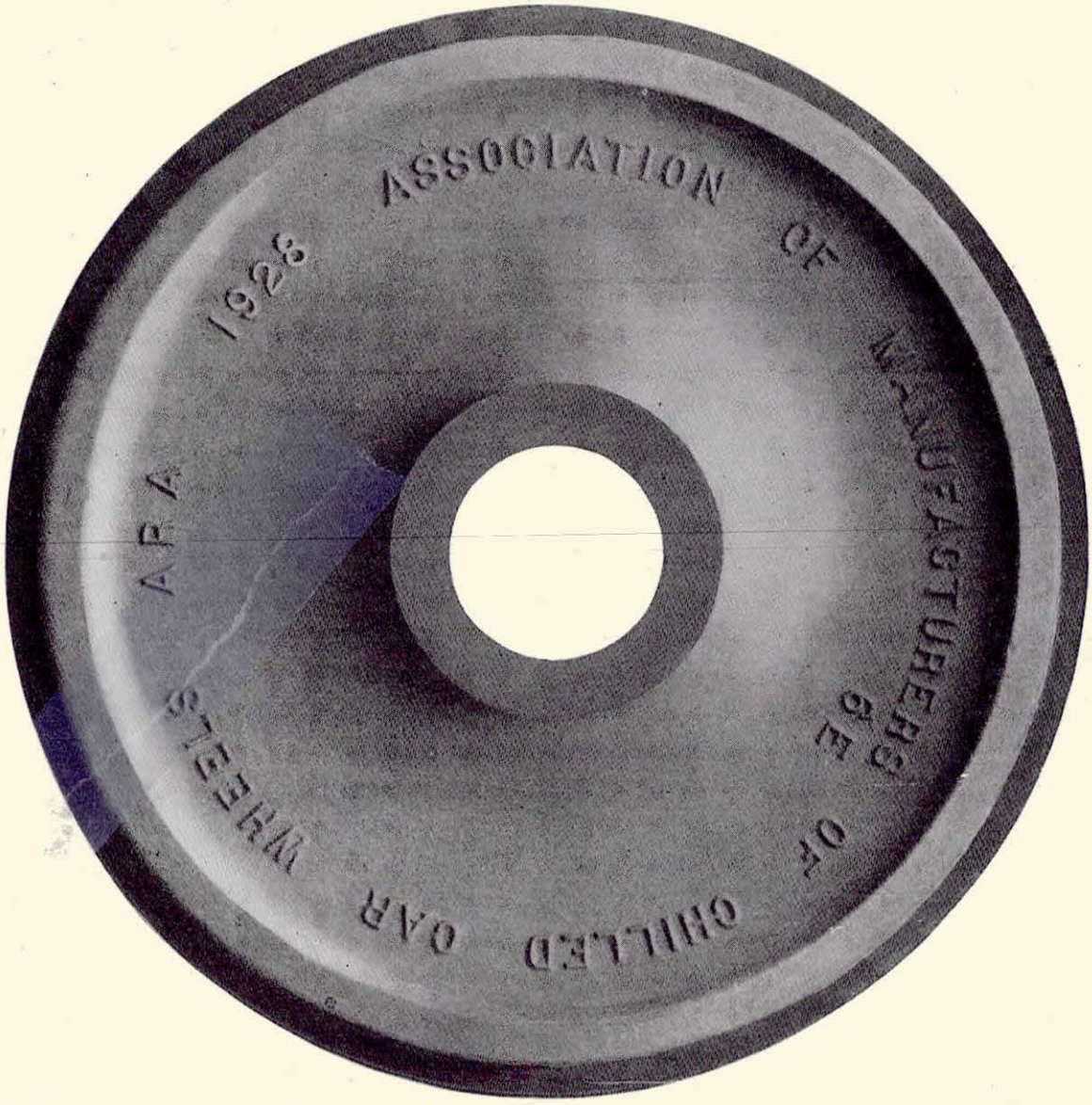

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CHILLED TREAD WHEELS

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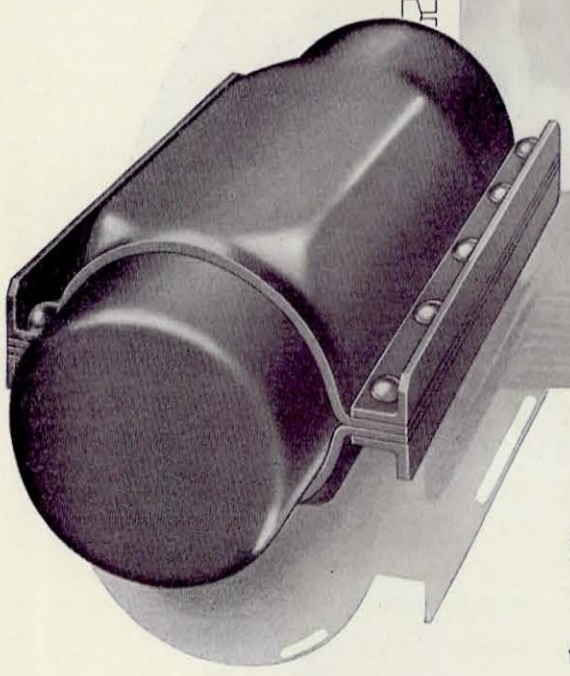
ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCORMICK BUILDING, CHICAGO, ILLINOIS

ENDURANCE



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EDGEWATER STEEL COMPANY
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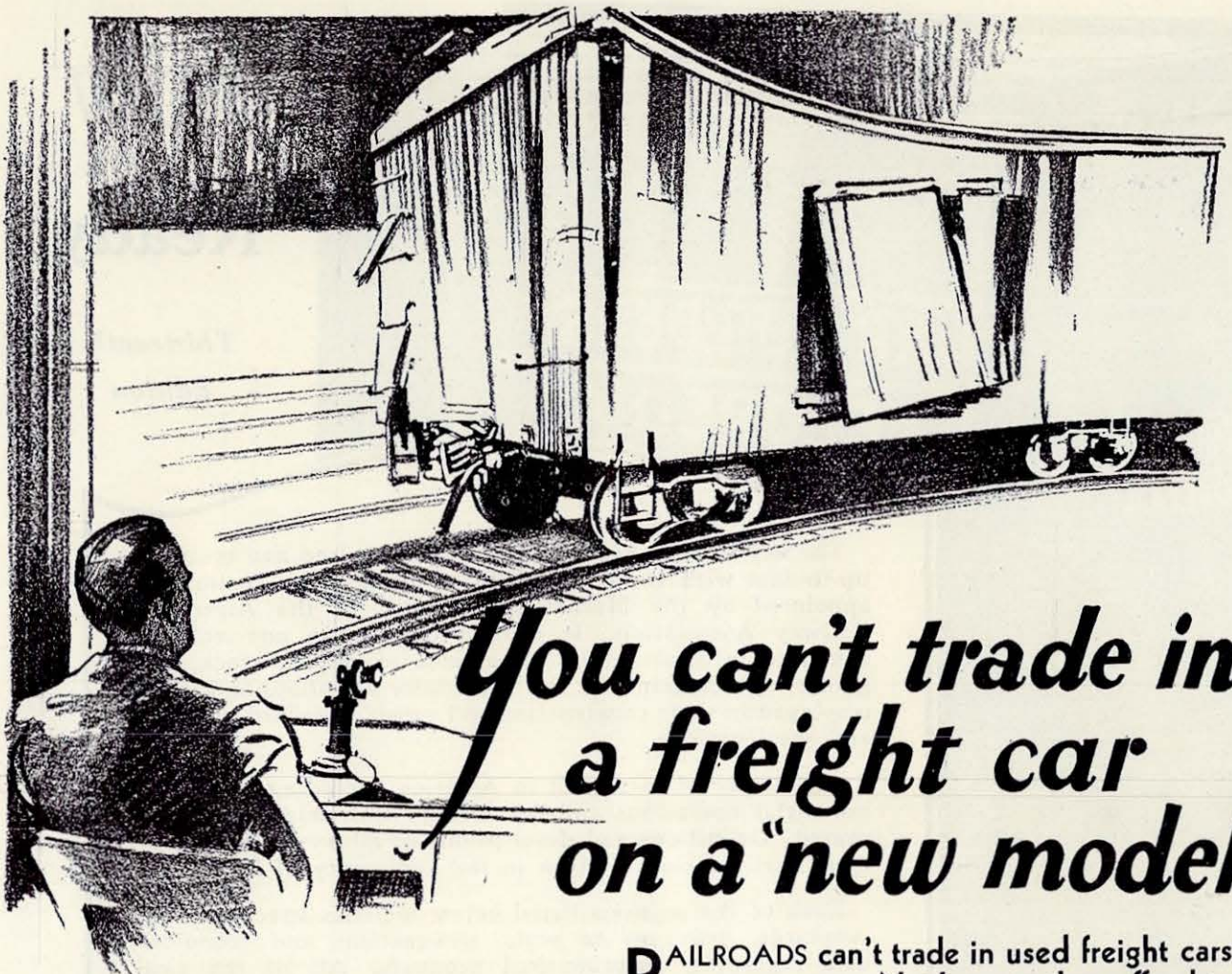

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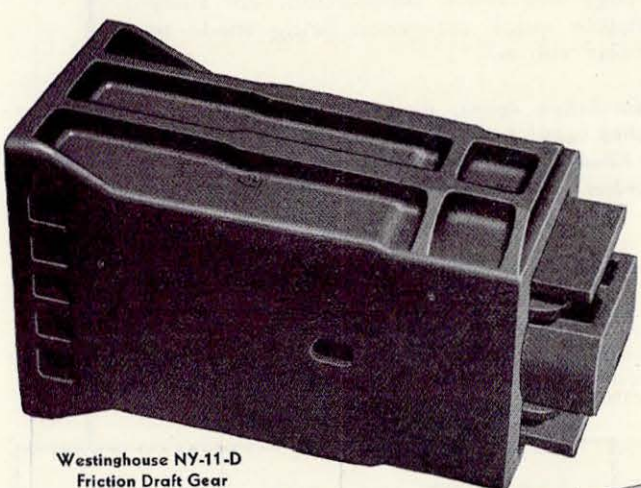

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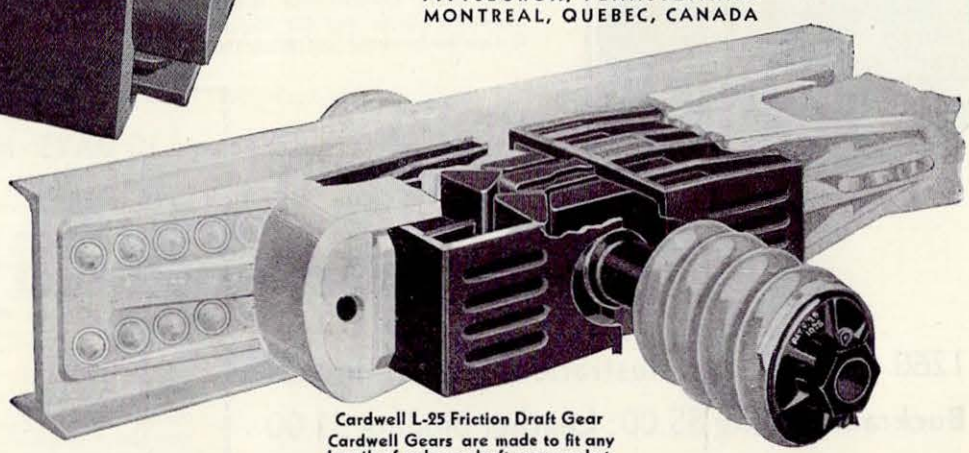
Westinghouse Draft Gears can be applied with any type of attachments.

Cardwell and Westinghouse Draft Gears

Are made in sizes and capacities to meet all modern and A. R. A. requirements for locomotives, freight and passenger cars.



Cardwell L-25 Friction Draft Gear

Cardwell Gears are made to fit any length of yoke or draft gear pocket.

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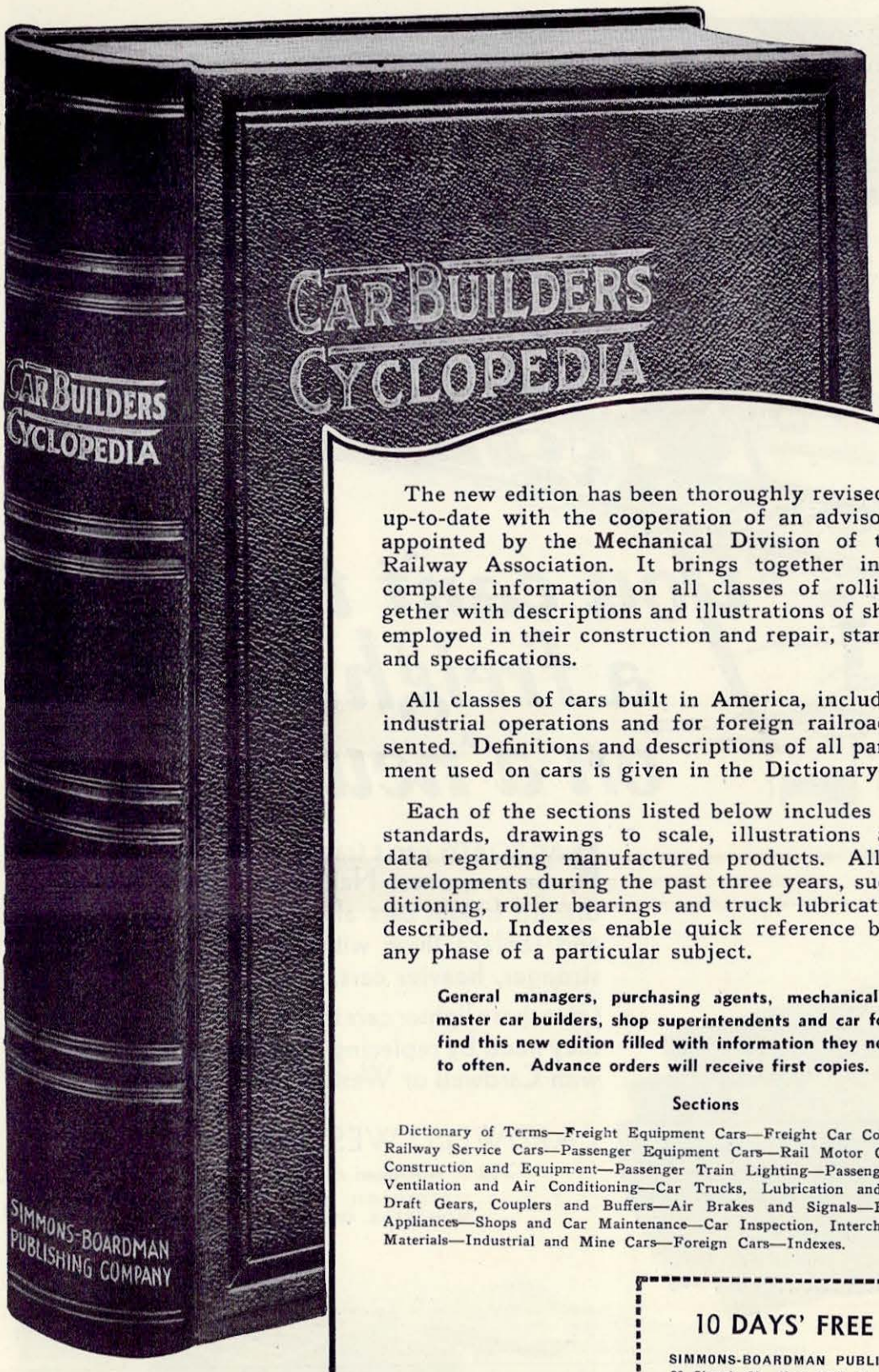

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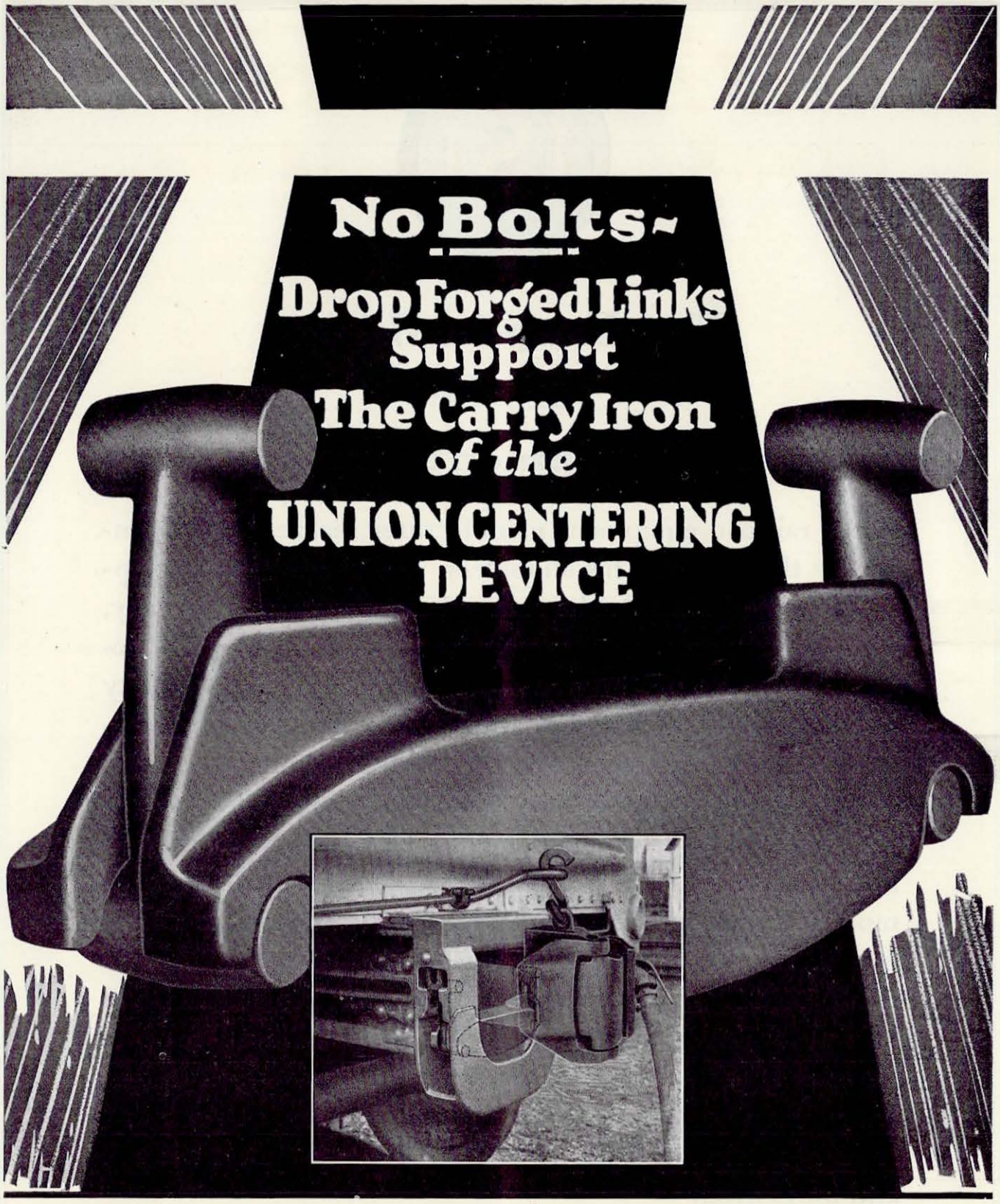

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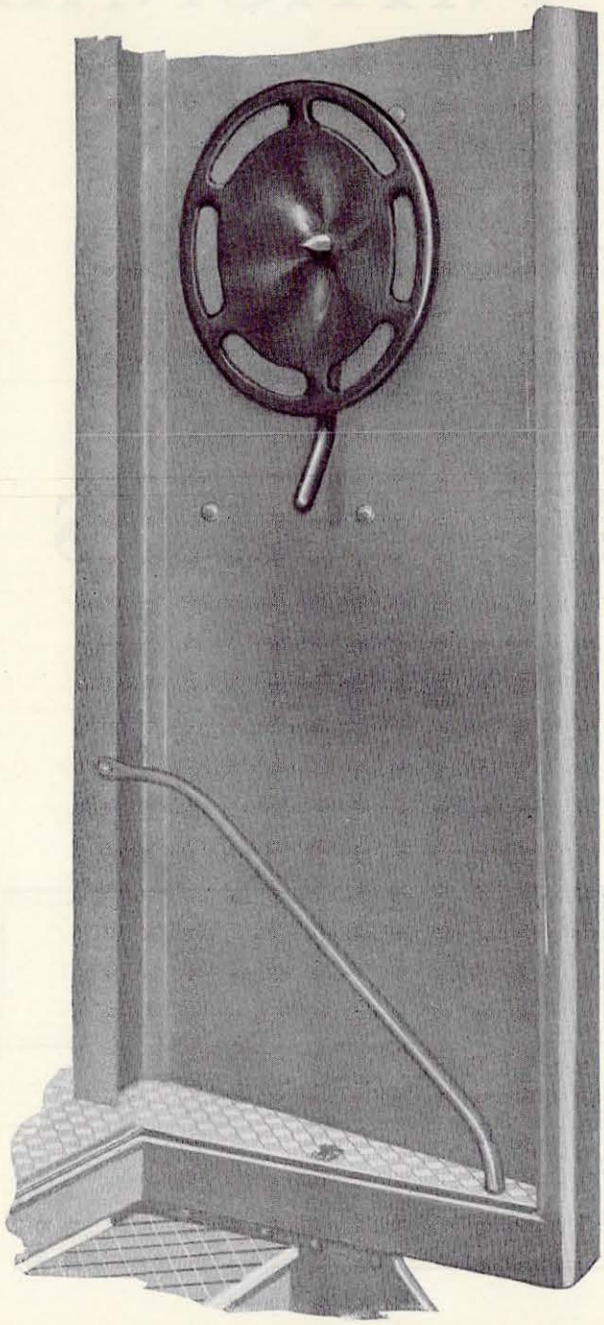
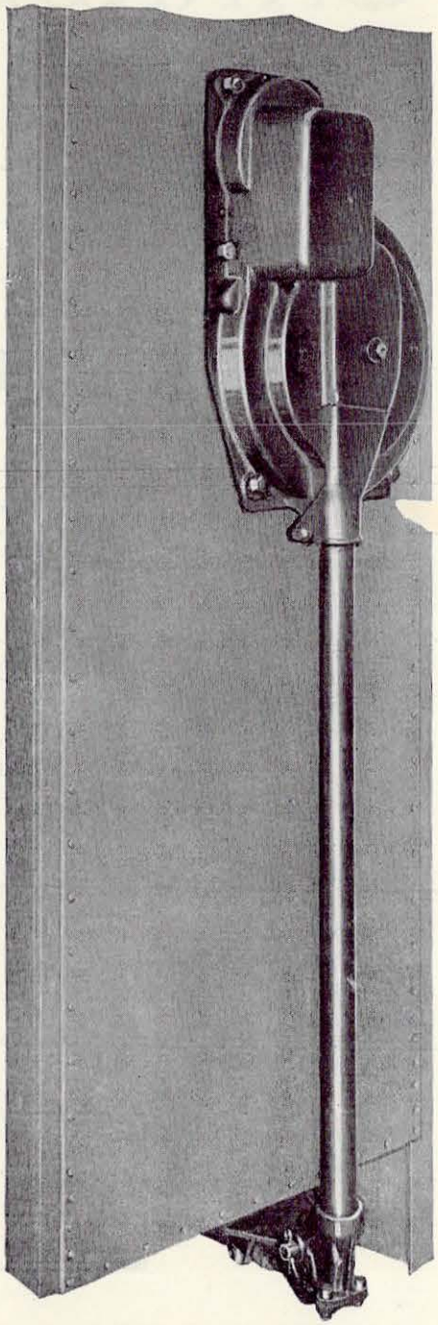


INSIDE

FOR VESTIBULE CARS



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Government in Business, Doles and the Depression

Whatever signs of an approaching improvement in business there may be, it is a fact that the present depression already has been one of the longest in history, and has been more profound within recent months than at any previous time. The unemployment situation continues bad, and prominence is given in the press to news from Washington that leaders in government and business are working on plans of relief to prevent federal legislation establishing a system of doles for the unemployed. The prevention of such legislation is highly desirable. Experience in Great Britain and other countries shows that, once doles for the unemployed are provided, it is almost impossible to abolish them, and that, while undermining the morale of their supposed beneficiaries, they become a heavier and heavier burden upon industry and the taxpaying public.

More important, however, than prevention of doles for the unemployed is consideration of the causes of the coming, prolonging and deepening of the present depression, which has created the existing unemployment, and there is an increasing tendency for those who study it to agree regarding its principal causes.

The Chicago Tribune expressed the view of a growing number of students of business and economics when it said in an editorial in its issue of August 2: "The chief cause of the present world-wide depression is the excessive expenditure of government. This has diverted enormous sums of money from constructive enterprise and piled up a huge burden of debt for this enterprise and the people to carry. * * * We are still as a nation rich; but no nation, however rich, can survive this devitalizing process."

Policies of Giving Doles Already in Effect

Why have government expenditures increased so much? Most persons disregard facts that make them uncomfortable. One important fact that is being widely disregarded is that, while eminent men are deprecating the adoption of a government policy of doles for the unemployed in this country, the people of the United States are suffering from excessive taxation largely because of government policies of doles that already are in effect. Furthermore, our state and national governments have followed a dole policy in the regulation of railway rates which has been as harmful in proportion as their dole policies in levying and using taxes. These dole policies are largely responsible for industry and commerce having been thrown completely out of adjustment and for the present depression having become so much longer and more severe than anybody anticipated; but many of their supposed beneficiaries are struggling to perpetuate them.

The government policy of loaning money to farm cooperatives at rates of interest lower than those paid by private enterprise, and of buying farm products to maintain their prices, has been simply a policy of doles for the farmers. It has not helped but injured the farmers because it has stimulated the production of commodities of which there already were surpluses, and thereby helped cause the prices of these commodities to decline to some of the lowest levels ever reached. At the same time, it has injured everybody else by increasing taxes.

The policy favored by Congress when it passed the Hoch-Smith resolution, of readjusting freight rates downward on products of depressed industries and advancing them on products of prosperous industries, was a policy of paying doles through freight rates. The Supreme court held that the Interstate Commerce Commission's interpretation of the resolution was incorrect, and intimated that if it had been correct the resolution probably would have been unconstitutional. The commission, nevertheless, has continued to carry out the resolution according to its own interpretation, as is shown by the recent reduction of grain rates.

On sound principles of law and economics the railways during the last ten years should have been given rates that would have enabled them to earn a fair return. Their rates were reduced and held down, and they were thereby denied a fair return, upon the

theory that low rates would help general business. Government regulation was used to force the railways, in effect, to give doles to shippers. Some persons criticize the railways for now asking for a general advance in rates as an effort to make other needy industries help them. It is doubtful if any other large industry is as needy at present as the railroads, and they are so needy largely because of past regulation. If it was sound to use the power of government to make them give doles to other industries during the period of prosperity, it is surely more sound to make other industries help them now. It would be much better for all concerned, however, for the government at all times to regulate the railways, not in accordance with a policy of doles, but in accordance with sound principles of law and economics.

The federal government expenditures being made upon the Boulder Dam project are an illustration of a dole being given to the business interests and people of a particular territory at the cost of all the taxpayers of the country.

Doles for Shippers on Inland Waterways

The government's inland waterway policy is entirely one of doles, because it enables shippers who use the [illegible]vet their freight transported largely at the cost of the taxpayers; but large business interests that oppose doles for the unemployed seem to consider it entirely consistent for them to accept doles and seek increases of them through the development of water transportation.

A waterway conference held at Davenport, Iowa, on June 19, under the auspices of the Upper Mississippi River division of the Mississippi Valley Association, "announced," according to the Waterway Bulletin published by the Mississippi Valley Association, "that the business men of the upper Mississippi valley were in favor of a $500,000,000 bond issue by the federal government for the purpose of completing our national waterway program within a period of five years." "To increase taxes at this time would unduly burden business, industry and the people generally," said C. C. Webber of Minneapolis, president of the Upper Mississippi Barge Line Company. "Therefore we propose that Congress shall, at its next session, adopt the plan used by Roosevelt in financing the construction of the Panama canal, and authorize the issuance of at least $500,000,000 of bonds." Tolls are charged for the use of the Panama canal. Obviously, if the government does not also charge tolls upon inland waterways, the cost of constructing and maintaining them will be paid by the taxpayers, and will be doles given by taxpayers to shippers, whether the waterways are built with money raised by the issuance of bonds or in some other way. But Mr. Webber said nothing about tolls upon inland waterways. He was advocating, not tolls, but doles.

The highway policies of the state and national governments are largely policies of doles for the benefit of operators of buses and trucks and of the road building and the motor vehicle manufacturing industries.

In 1929 expenditures on rural roads totaled $1,646,030,433 of which less than 42 per cent was met by special motor vehicle and gasoline taxes, leaving a burden of $958,300,081 on the shoulders of the general taxpayers. The American Road Builders' Association recently released to the press a statement to the effect that "motor vehicle taxes should be used for the benefit of motor vehicle drivers, and any diversion of such taxes to other uses than roads will be fought to the bitter end by the 26 million motor vehicle owners—one-fifth of the population of the United States." The American Automobile Association also has publicly declared against any expenditure of motor vehicle taxes excepting on highways. The highways represent a huge investment which is not taxed because they are public property. Motor vehicles are private property which represent another huge investment. If restricting tax payments on one class of property to use for the direct benefit of that property is a sound principle, then why is it not equally sound for all classes of property? If motor vehicle taxes, and in particular those of vehicles using the highways as a place of business, should be used exclusively for highways, then why not use railway taxes exclusively for maintenance and improvement of railroad tracks? Why not use all the taxes the farmer pays for repairs to his fences and paint for his barns? Why not devote the householder's tax payments to landscaping his lawn?

Taxes and Doles for Highway Users

To devote all the taxes paid on each form of property exclusively to the benefit of that property would condemn to starvation the general functions of government—police and fire protection, education, the courts, hospitals. Is there any reason in sound public policy why dollars invested in farms, in factories, in homes should be compelled to pay their full share of general government expenses while dollars invested in motor vehicles are exempted? Is investment in farms, factories, homes and other forms of property something to be discouraged by added tax burdens, while investment in motor vehicles is stimulated by exemption from any share in the costs of governmental functions, aside from road building? In other words, should other kinds of property continue to be excessively taxed for both general government and highway purposes in order, in effect, to provide doles for those who wish to use the highways at less than cost, and to build highways and manufacture motor vehicles for such use?

The history of almost every civilized nation that has fallen shows that its destruction has been largely brought about by excessive increases in government expenditures resulting in increases of taxation, which,

as the Chicago Tribune says, have within recent years in this country "diverted enormous sums of money from constructive enterprise and piled up a huge burden of debt for this enterprise and the people to carry." Probably never in history did any nation travel more rapidly this road to economic ruin than it has been traveled in the United States within the last decade. From 1924 to 1930 the expenditures of the federal government increased $487,500,000. From 1923 to 1928 the expenditures of the local and state governments increased $2,261,000,000. The economic effects of these enormous increases in government expenditures were obscured until within the last two years; but now they should be plain to every student of business and economics.

The principal present need of the United States is for its leaders in both public and business life to learn, as their forefathers knew, that, in the long run, the less government there is in business the better it will be for both business and the public, and that widespread intervention of government in business and inequitable and excessive taxation are quite as ruinous in their effects when inspired by the "classes" for their own supposed benefit as when inspired by demagogues for the supposed benefit of the needy "masses."

New Motor Vehicle Restrictions in Litigation

The fight for proper regulation of the sizes and weights of commercial vehicles operating over the highways, and for restrictions adequate to protect the public interest in the highways from unwarranted exploitation, does not end with the enactment of regulatory laws by legislatures and their approval by the governors of the states. The struggle of the motor vehicle interests, to prevent passage of the new laws, is continuing with undiminished vigor, while in some states they are carrying litigation designed to prevent the enforcement of laws already passed by court findings that they are unconstitutional.

Federal courts in Illinois, Texas and other states, where laws providing for rigid restriction of the sizes and weights of motor vehicles operated over the highways were passed in sessions of the legislatures this year, have already granted temporary injunctions restraining enforcement of the laws. Within the last few days, the federal court at Houston, Tex., has held that the new Texas law restricting the loads of cotton which trucks can haul in that state is unconstitutional and therefore invalid.

The outcome of other suits filed by motor vehicle interests is still in doubt, but decisions on them should be forthcoming shortly, and will indicate the kind of legislation that the courts will or will not sustain.

Does Section 15a Mean Anything?

The fair return of 5¾ per cent which was at least "contemplated" by Section 15a of the interstate commerce act is probably a matter of merely academic interest just now, an unrealized dream of the past to be forgotten for a time in the face of stern realities. Nevertheless it would be exceedingly interesting if the courts should give an authoritative interpretation in the western grain rate case, now pending, of what the rule of Section 15a of the interstate commerce act actually means. The Interstate Commerce Commission has given it very little meaning since 1920, when it ordered a large increase in rates designed to afford the railways a fair return on a tentative valuation of $18,900,000,000, or at least since 1922, when it decided that a "fuller assurance" of realizing the contemplated return might be afforded by a 10 per cent general reduction. Since then it has confined itself largely to rate-making under the older provisions of the act, or under the still newer provisions of the Hoch-Smith resolution, doubtless hoping that the natural growth of traffic would in time bring about the fair return.

Now that all the traffic growth of a decade has disappeared the commission has asked Congress to change the law as "impracticable" and its counsel have submitted to the court a brief which attempts to read out of Section 15a its last vestige of meaning anything.

The railroads are contending in this case that the grain traffic represents so substantial a portion of their traffic that a lowering of grain rates generally is incompatible with the provisions of Section 15a, since the commission has found that they have not, since the passage of the Transportation Act, attained the fair return. They are taking the position that Section 15a imposes upon the commission an affirmative duty and that the standard of Section 15a must necessarily be read into the previous standard of reasonableness created by Section 1 of the act and supplement it. But on the ground that Section 15a has not repealed or superseded other sections of the act the commission counsel seem to argue that Section 15a has practically nothing to do with rate-making except in such circumstances as those attending the 1920 or 1922 rate cases.

According to the argument of the brief the act "contemplates" a fair return, but only "as nearly as may be." This expression, it says, "obviously contemplates that the return may be less than the fair return fixed by the commission." Whether such a fluctuation as is represented by a range of from 2 to 5 per cent in property investment is "as nearly as may be" is perhaps another question, but if emphasis on these qualifying words is not enough to give the com-

mission a free hand, counsel find enough additional leeway in the proviso that "the commission shall have reasonable latitude to modify or adjust any particular rate which it may find to be unjust or unreasonable" to justify almost anything.

Language is found in a Supreme Court opinion which refers to this proviso as applying to "any particular rate *or class of rates,*" the reasonableness of which, the court said, may be determined without consideration of the total net return at all, and on this basis the brief says that "if the rates prescribed by the commission here under attack will not, with other existing rates, yield the carriers the 15a (2) return, then it is the duty of the carriers to present to the commission proposals for rates on other commodities, which will approximate the 15a (2) design." What "other proposals" could they have presented after the commission reduced all rates in 1922? The quotation from the Supreme Court, incidentally, appears in a recapture case in which there was no point to be decided as to the meaning of "a particular rate."

"The commission is not under the duty," the brief says, "of taking over the management of the traffic departments of the carriers. They should initiate rates, not the commission." And this although Section 15a says *"the commission shall* initiate, modify, establish, or adjust such rates," etc. We understand that the grain rates under consideration were initiated by the carriers and that the commission had held them to be reasonable before the Hoch-Smith resolution caused it to examine them again.

Citations are given in the brief to commission decisions construing section 15a "to permit but not to guarantee, the carriers to earn 5.75 per cent," and holding that the "obligation" is "not cumulative," also that section 15a does not repeal or supersede other provisions of the act, and that the law was not intended to prevent the reduction of rates found to be unreasonable under Section 1, and on the strength of the Supreme Court dictum it is contended that the net return and 15a need not be considered in determining the reasonableness of a "class of rates." Section 15a begins by saying that the adjustment of rates to produce a fair return shall be done by the commission "in the exercise of its power to prescribe just and reasonable rates," but here counsel are contending that the fair return has nothing to do with reasonableness.

The commission's decisions in the 1922 freight rate and express rate cases are cited to show that the commission may reduce rates in compliance with 15a if it believes such reductions will give a "fuller assurance" to the carriers of realizing the fair return, or that increases would divert traffic to other means of transport or depress its volume, but we do not understand that the commission has offered any hope that a reduction in grain rates would increase the volume of traffic.

Of course it has heretofore been a little difficult to assert successfully in argument that the roads have not had a fair return because the amount of the valuation has been in controversy but that obstacle has now been removed because in this very grain case the commission said that the western roads had never had the fair return and in its report to the Senate committee in January, in which Section 15a was characterized as impracticable, it said unequivocally that the roads as a whole "have never been able, since 1920, to obtain the aggregate earnings contemplated by Section 15a" . . . "even on the basis of our estimates of aggregate value, which did not reflect in any substantial measure the current cost of reproducing the existing railroad properties," and which, it may fairly be said, were on about the lowest basis which could reasonably be suggested. In fact the net return which the railroads have had since the law was passed has averaged less than they earned during the three years preceding their taking over by the government, which was taken as the measure for the rental paid them by the government, and has been less than 5¾ per cent on the value tentatively used by the commission in the 1920 rate case.

Train Hour Costs Reduced

Since 1927 the Interstate Commerce Commission has required the railways to furnish a report entitled, "Operating Revenues and Operating Expenses by Class of Service," and the Bureau of Statistics has analyzed this information in terms of road-freight-wages, fuel, supplies and engine-house expenses per freight train-mile and per freight gross ton-mile. Based on these data, prorated back to 1923, an extensive study has recently been made of the performance of 47 roads, as set forth in an article elsewhere in this issue. This is an interesting effort to use cost data in general averages and to relate actual cost figures to the increase in train-mile or train-hour productivity. In this article, emphasis is placed on the consistency of the improvement in operation, year after year. As a means of comparison, the roads are separated into groups, based on the proportionate mileage of signaling in service, although no credit for improvement in operation is claimed specifically for the signals. Rather, it is intimated that a well-managed road is likely to be well signaled and that able management has a keen realization of the value of signaling facilities as an adjunct to efficient operation.

Indexes to Volume 90

The indexes to the latest volume of the *Railway Age*, January to June, 1931, are now ready for distribution. Those desiring copies should advise the New York office, 30 Church Street.

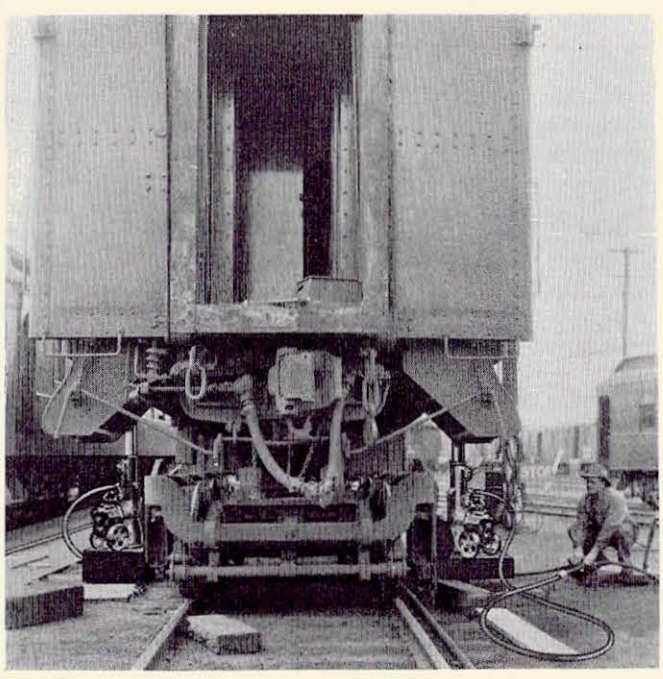
Coach-Yard Facilities Pay Big Return

Modernization of the average terminal coach yard will effect operating economies that are unusually large, considering the cost

"RAILROADS will spend millions on new passenger terminals, knowing that they probably will return no profit. Why is it that they fail to invest a few thousands in passenger-car maintenance-yard facilities which will pay for themselves in a few months?" The result of a survey of several coach yards was the surprising discovery that at one yard alone on a certain road, considered as typical, the investment of $27,900 in modern facilities would effect a reduction in maintenance expenses of $83,900 a year. If there is any operation on a railroad, economies in which should make a strong appeal, it is the operation and maintenance of passenger trains where the competition of newer forms of transportation and the constant necessity for providing more attractive service has increased the expense of that service in the face of steadily diminishing revenues.

In making its survey of terminal coach yards the *Railway Age* staff was immediately confronted with the fact that, in comparison with the installation of modern facilities in freight yards, locomotive shops, freight and baggage handling stations, etc., very little thought has apparently been given to the problem of supplementing labor in passenger-car yards with those modern appliances that have already been developed for service of that nature.

The entire operation of the average coach yard involves two general types of work—coach cleaning and coach repairs. The possibilities for making savings in operating expenses seem to be about equally divided between these two different phases of maintenance work.



One Man Operates Two Power Jacks

Power Trucks Save Time in Icing Passenger Cars

The figures involved in this study are based upon actual costs of present operations in a coach yard handling an average of 300 cars a day. Owing to the fact that the particular yard studied was not equipped with the modern facilities which this survey indicates are desirable, the comparative costs under modern methods are estimated while the costs under existing methods are actual. The estimated figures, however, are based on operating data from other coach yards having installations of certain units of modern equipment but in no case having complete modern layouts.

While the costs given are for a yard handling 300 cars the cost per car will remain about the same for a yard handling more or less cars. Certain units of equipment have capacity far beyond any normal requirements, the capacity being regulated by the working time. Other equipment items are in units capable of handling 100 to 150 cars a day, the output depending upon the hours worked and the number of units employed. Where man power only is involved, control is possible through the increase or decrease of either workmen or hours.

The cars handled in this yard are distributed according to types, as follows:

Type	Number	Percentage
Pullman	102	34
Suburban coaches	63	21
Coaches	39	13
Diners	27	9
Club-cafe	18	6
Mail	15	5
Baggage and express	36	12
	300	100

The average labor cost of cleaning the exteriors of these cars (exclusive of trucks) is 72.18 cents per car passing through the yard daily where the cars are cleaned by hand methods, using buckets and brushes, plus a charge of 7.9 cents per car for supplies, making a total cost of 79.88 cents per car. At the rate of 300 cars a day it is necessary to clean 109,500 cars a year at a total cost of $87,469. The installation of a modern mechanical car washing and scrubbing machine at an investment of from $8,000 to $10,000 would reduce the average cost of cleaning per car per day to 40.63 cents or an annual total of $44,490, indicating a yearly saving of $42,979.

In the cost of machine cleaning is figured interest, depreciation and maintenance on the washing machine, the necessary supplies, power and water as well as the time required for a switching crew to handle the cars through the machine.

There is a possibility that in some instances an electric car puller could be used more effectively than a switching locomotive to handle the cars through the washing machine, thereby making a substantial reduction in the above cost per car. This would depend on the layout of the coach yard. Where the yard is so situated and the washing machine so located that the cars can be run through the machine as they enter the yard without additional handling from the station it would, of course, be more economical to make use of the switching locomotive. The estimated cost of moving cars with a car puller, including interest, depreciation, maintenance on the machine and attendant labor required, is approximately 6.5 cents per car as compared with 14 cents for moving with a locomotive.

Interior Cleaning

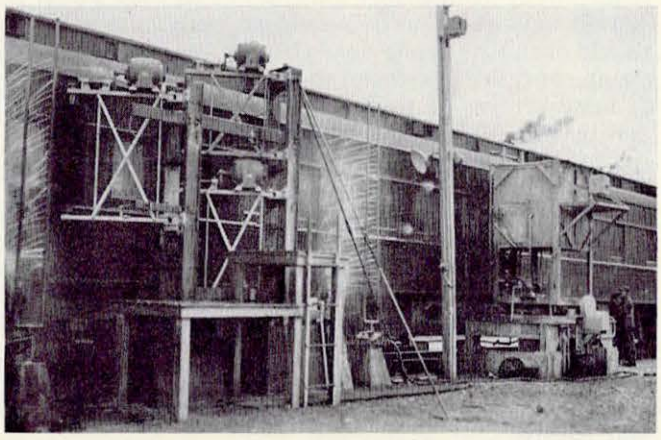
Where cars are cleaned by hand methods, a study of the costs in a yard handling 300 cars a day indicates that the actual cost for 198 cars (the interiors of Pullman cars are cleaned by Pullman Company forces) is 43.55 cents a day per car passing through the yard. These costs include all hand sweeping, dusting, brushing, beating the dust out of the seats and blowing out the interior of the cars with air. It also includes the cleaning of the carpets, plush seats and seat backs with a home-made air suction outfit. On the basis of handling 198 cars a day, the annual cost of cleaning cars by hand methods amounts to $31,473.

On one road which has recently changed over to a complete cleaning system for handling this work, it is reported that the costs have been reduced 22 per cent per car. The coach yard is equipped with two four-outlet portable electric vacuum cleaning machines fitted with special nozzles and brushes for cleaning moldings side walls, floors, ceilings, curtains, carpets and seat plush. The investment required for the installation of such a vacuum cleaning system is approximately $5,500. On the basis of 198 cars a day, at 22 per cent saving, the cost of car cleaning would be reduced to 33.97 cents per car or $24,550 a year, indicating an annual saving of $6,923.

Icing Passenger Cars

Another job in the coach yard on which modern equipment can undoubtedly save money is that of icing passenger cars. Under the present system in use in most coach yards, ice is loaded in a small four-wheel ice truck having a capacity of about 500 to 1,000 lb. (enough to ice 10 to 16 cars). These trucks are pulled by hand from car to car while the cars are being iced. Ordinarily, two men handle a truck and fill the individual ice buckets which are placed on the car platforms for the inside men to handle to the coolers. Two men can average about 15 cars an hour, including the time it takes to go to the ice storage and fill the trucks. At current wage scales, this cost will amount to about 8.53 cents per car. If an electric truck, involving an investment of approximately $2,200 is used for this work, the truck can handle three trailers of ice at one time, which is sufficient for the icing of from 30 to 50 cars. This eliminates two trips out of three to the ice storage for refilling the trucks—each of which usually consumes about 20 minutes when the work is done by hand. Due to the greater speed at which the electric truck can operate, a time-saving of approximately 20 minutes can be added to the 40 minutes saved by eliminating the trips for refilling the trucks, thereby making a total saving of approximately one-third of the time required. With the electric truck, cars can be iced at the rate of 20 an hour and the cost, including labor, interest and depreciation on truck investment, and truck operation and maintenance will be 5.4 cents a car.

The savings by the electric truck method in a yard handling 300 cars a day, an average of 264 of which are iced, would amount to 3.13 cents per car or an annual saving of $3,016 a year.



Cleaning the Exteriors of Pullman Cars with the Combined Car Washing and Scrubbing Machine

Passenger-Car Repairs

In the normal processes of making running repairs to passenger cars in coach yards, there are a number of operations that have to be performed, such as changing wheels, changing bearings and bearing wedges, adjusting the height of couplers by shimming the springs and center plates, and other miscellaneous truck or bottom work for which it is necessary to raise the body of the car. In the majority of coach yards, the raising and lowering of the cars is accomplished at the present time by the use of hand-operated jacks, and wheels are removed by means of a shop-made air hoist located in a pit under the track. In order to handle the above mentioned repairs on 300 cars, the daily labor cost with this equipment (the men working on three shifts) is $324.48, or $1.08 per car passing through the yard. By the use of modern equipment, that is, air-motor-driven hoists and modern drop tables, the same amount of work can be handled with equipment involving an investment of $10,200, for a daily labor cost of $236.40 or 79.73 cents per car passing through the yard, which figure includes interest, depreciation and maintenance on the new equipment. On the basis of the above figures, the annual cost for repairing cars under the old

method is $118,260 while, with the new equipment, it would be $87,305, or a saving of $30,955 a year.

Conclusion

After considering the potentialities of a modernization program from a dollars and cents standpoint alone, there remains only the conclusion that the so-called non-revenue departments can make a real contribution to net operating income if given the facilities. The automobile industry considers that any piece of plant equipment that will pay for itself in three years is entirely justified. A summary of the savings that can be made as outlined in this article shows that certain coach-yard facilities will pay for themselves three times in one year.

In Next Week's Issue

The tracks of American railways as they are being designed and built today are better able to withstand the service to which they are subjected than at any time in the past. But in spite of this, the track is admittedly an imperfect structure—the cost of maintaining it in condition for use is still too great. Demonstrated results obtained by the more progressive railways and thorough-going investigations point to opportunities for further operating economies, from better and stronger track construction. This productive field for savings will be discussed in next week's article.

Summary of Costs, Investment, and Savings

Items	Old Methods	New Methods	Investment	Savings
Exterior Cleaning	$87,469	$44,490	$10,000	$42,979
Interior Cleaning	31,473	24,550	5,500	6,923
Icing Cars	8,219	5,203	2,200	3,016
Repairs	118,260	87,305	10,200	30,955
Totals	$245,421	.....	$27,900	$83,873

Railroad Earnings Held for Recapture

WASHINGTON, D. C.

THE Interstate Commerce Commission is resorting to "strong-arm" tactics for recapturing excess net railway operating income without the necessity for first justifying to a court its methods of calculating the excess. At its suggestion and request the Comptroller General, J. R. McCarl, has notified the Richmond, Fredericksburg & Potomac that all earnings of that road for transportation for the federal government including mail, passenger and freight transportation, hereafter accruing, will be withheld for application against the indebtedness of the company to the recapture fund, as calculated by the commission, until a sufficient amount for the purpose has accumulated, or until other satisfactory arrangements are made to take care of the indebtedness.

This plan has been adopted, according to a letter from Chairman Brainerd of the commission to Comptroller General McCarl, on the theory that "if the commission is called upon to institute legal proceedings for the collection of these funds in this and other cases, which will arise under the act, the recovery of the funds and the administration thereof by the commission in accordance with the intention of Congress will unquestionably be subjected to serious delay."

However, the commission is thus avowedly seeking to avoid litigation in the first recapture case it has passed upon since its O'Fallon decision was set aside and in a case which bristles with valuation questions not yet passed upon by the courts because the Supreme Court had held that the commission's tentative valuations were not to be reviewed until they reached a stage where the commission should attempt to use them as the basis of an order.

The indebtedness referred to is the amount of $696,705, the unpaid portions of the excess income of the company for the years 1922 and 1923 found by the commission to be payable to its recapture fund. In an order dated April 7 the commission directed the carrier to pay the amount within 90 days from that date and a further provision of the order directed the company to render a statement of its profits received from the use of this "trust" fund and to pay such profits within 120 days. As previously reported, the R.F. & P. failed to make the payment by the date set, apparently on the theory that it would possess some advantage if the government should be forced to sue it for the amount, as compared with the plan of seeking an injunction against the commission's order, which was followed by the St. Louis & O'Fallon when the commission issued its first recapture order against it.

The plan adopted by the commission and Mr. McCarl will not necessarily avoid a court review of the commission's methods in this case, such as was afforded in the O'Fallon case, as the railway company may still find a way to contest the case in court, but seemingly the plan adopted would have an important effect on the location of the burden of proof and it may be that the commission would prefer to defend its methods of valuation from attack than to go to court itself, just as the R. F. & P. apparently had figured that its strategic position would be stronger if the government were forced to take the initiative.

Chairman Brainerd, in his letter to Mr. McCarl, referred to the provisions of law involved and stated that the commission after full hearing had made its determination of the net earned by the R. F. & P. in excess of 6 per cent but that, as the time for payment had expired the commission was confronted with the question as to the proper course it should pursue in compelling the carrier to make the payments.

"Respecting the procedure," he said, "briefly it may be said that the carrier has a clear-cut and well understood remedy, if it desires to contest the order, by bringing an action in the district court to have the order set aside. Undoubtedly the commission also may resort to legal means to enforce payment of the sum, although there is no precedent by way of legal decision indicating clearly the appropriate remedy for enforcing the order.

"In view of these circumstances, the commission has directed me to call to your attention the fact of the issuance of the order and that the same remains unchallenged by the carrier in any direct proceeding, in order that you may take under advisement the desirability and the propriety of offsetting against the carrier's indebtedness to the United States under this order any sums which may be payable to the carrier for services performed by it for the United States."

The Comptroller General replied saying that his office had held previously that the funds received from railroads as excess income under the interstate commerce act were public funds of the United States and that in

order to protect amounts otherwise due from railroad companies his office frequently has resorted to the means of withholding from payment to such carriers earnings from mail, passenger and freight transportation in cases where the interests of the government were not fully protected or the carriers had failed to liquidate their indebtedness when called upon to do so, and "no reason appears why, in the present matter, the same procedure may not be adopted."

The commission has made public tentative recapture reports, accompanied by orders to remit unless protest is filed within a stated period, amounting to some $25,000,000 as half the excess found, but the R. F. & P. case is the only one except the O'Fallon case in which the commission itself has passed upon such a report and issued a final order. In the other cases protests have usually been filed and many hearings have been held. The largest amount of excess found was in the case of the Norfolk & Western, which was ordered to pay $15,849,689. On August 7 the commission issued a similar tentative report in the case of the Pere Marquette, ordering it to pay $820,512, but most of the reports have involved the smaller roads and are for periods ending with 1926.

Whereas in the O'Fallon case the Supreme Court held the commission's valuation method invalid on the ground that it had not accorded proper weight to cost of reproduction, in the subsequent tentative recapture reports the commission's Bureau of Valuation has attempted to give some weight to this factor by averaging it with an estimate of original cost. In the R. F. & P. case the commission held that in determining value for rate-making purposes consideration must be given both to original cost and to cost of reproduction but that the weight to be accorded each should vary in different cases. In the O'Fallon case it said that it knew of no way of according less than full weight to cost of reproduction except by caprice and it failed to show how much weight it had accorded in this case, but its figures indicated that it had used a weighted average giving 75 per cent weight to cost of reproduction less depreciation and 25 per cent weight to an estimate of original cost, depreciated in the same proportion as the reproduction cost figures, which were based on prices covering an unnamed period prior to the recapture date. The estimate of original cost was also based on the estimate of cost of reproduction at 1910-1914 prices.

It has been suggested that the commission might possibly have allowed as much as 75 per cent weight to reproduction cost in this case in order to "get by" with it without in any way committing itself to being so liberal in another case, although the railroad company undoubtedly would question any suggestion of "liberality" because the R.F. & P. is a railroad of the kind as to which counsel for the carriers have often contended that cost of reproduction should be given dominant weight.

From the start of its administration of the recapture law members of the commission have appeared particularly resentful of the efforts of the carriers to insist on what they considered an adequate valuation, because they have held that the law contemplates a more "summary" process of ascertaining valuation for recapture purposes than for other purposes, and it has even been suggested that the commission might fix a recapture valuation without a hearing, using more refined methods later in completing its valuations under Section 19a. The commission has been somewhat resentful of the idea of court review of its valuation methods in general but in addition it undoubtedly regards its recapture job as a supreme nuisance, requiring as it does a separate valuation for each carrier for each year, and it has given strong reasons in recommending to Congress the repeal of the recapture clause. On the other hand many railroads have exhibited a tendency to resist the recapture of real money even more vigorously than they have contested the rate-making valuations which the commission has taken into consideration in many rate cases, in their incomplete form, although it apparently has not given them much practical weight.

The commission has on several occasions held forth to Congress the hope of recapturing large sums of money as an inducement for increases in appropriations for valuation work, but so far it has not recaptured any money except that paid to it voluntarily by some of the smaller roads, and it is rather anxious to make a showing.

Although the "period" prices for railroad construction and equipment used by the commission have now fallen to about 150 per cent of the unit prices of the 1910-1914 period used by the commission in its primary valuations, so that the Bureau of Valuation's "studies" as introduced in evidence in the rate advance case indicate a total cost of reproduction less depreciation not far from the property investment figures, this fall in prices does not affect the recapture cases for the more prosperous years of the period since 1920 because the recapture is supposed to be based on the valuation at the time of recapture.

Affirms Railway's Right To Protect Its Revenues

THE right of a railway to protect its passenger revenues through the operation of motor coaches where such service is required by public convenience—a right superior to that of an independent company proposing similar motor coach service—has been affirmed by the Ohio Supreme Court in a case involving the Pennsylvania, its subsidiary, the Pennsylvania General Transit Company, and an independent motor coach line. The independent line, called the White Star Bus Line, and the Pennsylvania General Transit Company applied to the Public Utilities Commission of Ohio for authority to operate motor coaches in intrastate service from Steubenville at the Ohio-West Virginia state line to the Ohio-Indiana state line. The commission held that public convenience and necessity required the granting of an intrastate certificate, but it granted the certificate to the White Star Bus Line and denied the application of the Pennsylvania General Transit Company. A re-hearing having been denied by the commission, error proceedings were instituted in the Ohio Supreme Court by the Pennsylvania, seeking a reversal of the commission's order.

The opinion of the court is abstracted below:

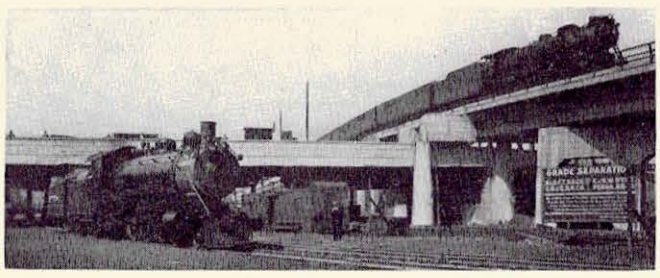
We are confronted with the determination of the question whether, under the evidence disclosed by this record, the certificate for intrastate operation from one state line to the other should be given to the White Star Bus Line or to the Pennsylvania General Transit Company. It is almost impossible to apply a hard and fast rule to cases of this character; each must stand upon the peculiar facts and circumstances tending to prove public necessity and convenience, for that has been established as the pole star for the guidance of the commission and the court. When public convenience and necessity have been established for the operation of a route, and applied for by one or more applicants, other features must be given consideration; whether a

(Continued on page 246)

Busiest Railway Crossing Is No More

Complex intersection at Fifteenth Place and Stewart Avenue, Chicago, eliminated at a cost of $4,000,000

ON July 31, traffic was turned over the last unit of a complex grade separation structure that eliminated what has been for many years one of the busiest and most complex railway crossings in the world, namely the intersection of the main and yard tracks of three trunk lines and one terminal railway on Stewart avenue between Sixteenth street and Fifteenth Place, Chicago. Until about four years ago, the layout in this location embraced 36 individual track crossings, but as a consequence of an exchange of property among the railways involved, certain yard leads were eliminated and the number of crossings was reduced to 22. However, until the remainder of the crossings were eliminated as the result of this grade separation project, which cost about $4,000,000, this busy intersection was crossed every day by all the passenger trains of Chicago & Alton, the Chicago, Burlington & Quincy and the Pennsylvania in moving to and from the Union Station; all the passenger trains of the Baltimore & Ohio, the Chicago Great Western, the Soo Line and the Pere Marquette in entering and leaving the Grand Central Station, empty movements of all of these trains; set-in and pull-out movements for freight houses of all these roads except the Soo Line; and transfer movements whereby the Chicago & North Western and the Burlington carry on a regular interchange with the Illinois Central and the Michigan Central via a local property known as the St. Charles Air Line; in addition to "drill" movements in the switching of yards whose throats were close to the crossings. In all, there were about 700 train and engine movements daily over the crossings, all of which were controlled entirely by manual signals of crossing tenders.



A Three Level Separation—Burlington Train Below, Transfer Train on Joint Line Viaduct Above, and Canal Street Viaduct at the Intermediate Level

A Complex Layout

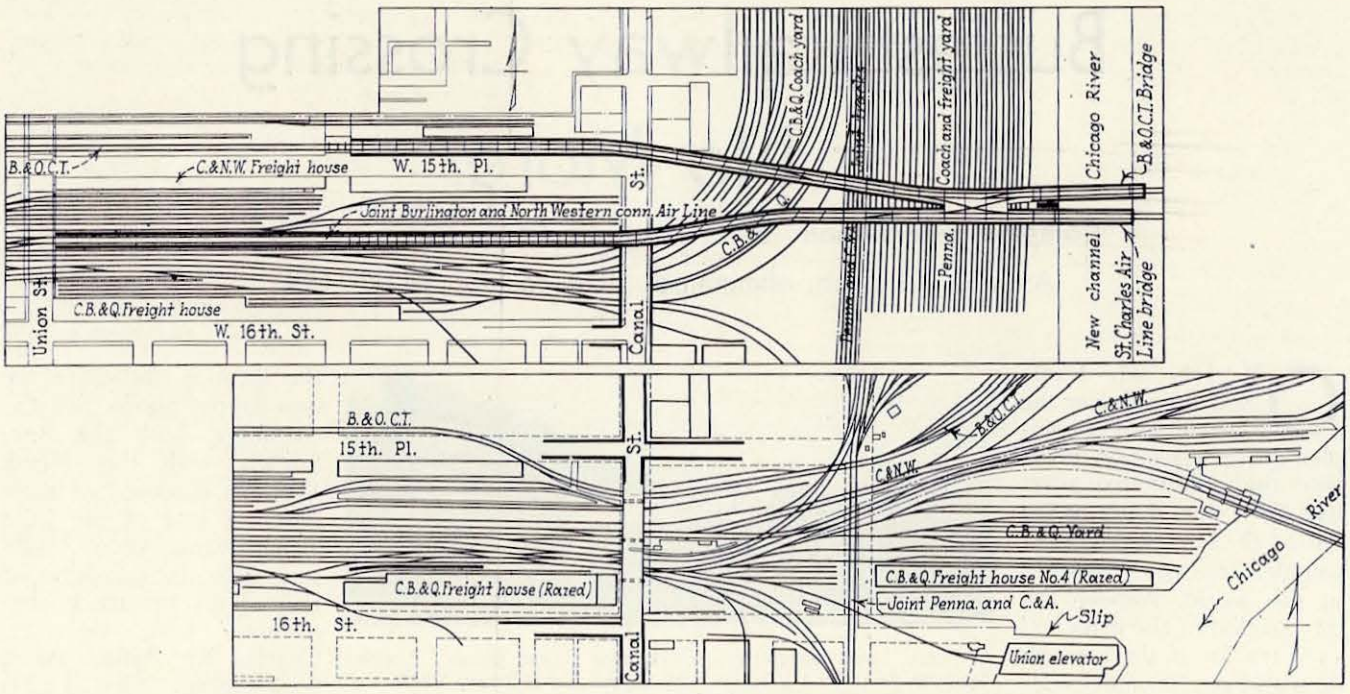
The map showing the layout at the crossing in the form that prevailed until about four years ago depicts its complexity better than it can be expressed in words. In addition to its function as a crossing this location was also the site of the junction of the two-track main line of the Burlington entering from the west with the joint two-track Pennsylvania-Alton main line, which was used by the Burlington to a connection with the Union Station tracks at Roosevelt Road. The wye-tracks were used for interchange and for the turning of Burlington, Pennsylvania and Alton passenger trains. The first step in its simplification came about as a result of the exchange of railway property pursuant to the straightening of the Chicago river from the position shown in the plan of the old layout at the right to the location shown in the new layout above. In the exchange, both the Burlington and the North Western disposed of their holdings east of the joint Pennsylvania-Alton main line, with the exception of their joint two-track connection with the St. Charles Air Line. As a consequence, the lead tracks to the yards of these two railways on the river bank were removed, as well as the lead to the old Union Elevator, which was destroyed by fire, and the Burlington freight house No. 4 which was razed.

Studies had been made at various times in the past for the elimination of this complex grade crossing, but these studies ceased to be of any value by reason of new conditions that were imposed by the changes in railway property required as a consequence of the straightening of the Chicago river. As described in an article by C. H. Mottier, published in the *Railway Age* of February 28, page 445, these embraced the removal and reconstruction of the St. Charles Air Line bridge on a new location across the new channel and the construction of a new bridge for the Baltimore & Ohio Chicago Terminal (the Terminal company owning the Grand Central Station and the line over which all trains using that station enter it).

However, the chief obstacle to a simple solution of the problem was the presence of Canal street which lies parallel to and 550 ft. west of the Pennsylvania-Alton main line. The grade of this street was separated from that of the Burlington, the North Western and the B. & O. C. T. years ago by carrying it over the tracks on a viaduct consisting of three three-truss through spans and one three-girder through span. But to maintain this street grade separation and also separate the grade of the Burlington from that of the B. & O. C. T. only 500 ft. away, and in addition provide a connection from the Burlington and the C. & N. W. to the St. Charles Air Line that avoided grade crossings, was no simple matter.

A Three-Level Crossing

The only practicable solution was a three-level separation at Canal street, with the Burlington tracks at a low level to permit them to meet the grade of the Pennsylvania tracks, the street at an intermediate level and the B. & O. C. T. and the joint-track connection with the Air Line on an upper level. The crossing of Canal street was therefore the key to the entire plan, since the elevation to which it was necessary to raise the B. & O. C. T. and the joint-tracks over the Canal street viaduct determined the grades and the length of the approach viaducts to this crossing.


B. & O. C. T.
C. & N. W. Freight house
W. 15th. Pl.
Joint Burlington and North Western conn. Air Line
C. B. & Q. Freight house
W. 16th. St.
Union St.
Canal St.
C. B. & Q. Coach yard
Coach and freight yard
Penna.
Chicago River
B. & O. C. T. Bridge
New channel
St. Charles Air Line bridge
B. & O. C. T.
15th. Pl.
C. & N. W.
C. B. & Q. Yard
C. B. & Q. Freight house (Razed)
C. B. & Q. Freight house No. 4 (Razed)
Joint Penna. and C. & A.
Slip
Union elevator
16th. St.
Chicago River

How the Crossings Were Eliminated—Old Layout Below, New Layout Above

The joint Bulington-North Western connection with the St. Charles Air Line, which had to be centered over the property line between the two railways, had to cross Canal street directly over the north abutment of the street viaduct over the Burlington. Consequently, the elevation of the joint-tracks over Canal street was determined by the sum of the headroom over the Burlington tracks and the headroom over the Canal street pavement, plus the thickness of the two viaduct floors. By using minimum floor thicknesses and lowering the Burlington tracks about one foot, the joint tracks were established at Elevation 45, City datum, or about 37 ft. above their former level.

A more favorable arrangement was obtained for the B. & O. C. T. line by shifting the tracks about 160 ft. to the north to take advantage of the descending grade of the north approach to the Canal street viaduct. This resulted in a summit elevation of 35 ft. on the B. & O. C. T. viaduct or 10 ft. lower than on the joint-track structure, in spite of allowance for a thicker floor.

With these elevations fixed, the grades of the overhead tracks were determined by the lengths of the permissible runoffs. West from Canal street the existing tracks of the Burlington, the North Western and the B. & O. C. T. ascended on grades of about one per cent to meet the level of earlier track elevation work extending west of Union street. Consequently, the runoff to the west from the Canal street over crossings had to descend only to the level of this track elevation at Elevation 24. However, as it was found impractical to extend the foot of descent further west than Union street, it was necessary to use a grade of 1.44 per cent on the joint-track approach and a grade of 1 per cent on the B. & O. C. T. approach.

East of Canal street, a grade of 1.87 per cent was required on the joint tracks in order to meet the grade of the B. & O. C. T. tracks at a scissors crossover connecting the two lines just west of the new river channel bridges. The maximum grade on the B. & O. C. T. line east of Canal street is 1.16 per cent.

The adoption of the grade separation plan, together with the exchange of property previously mentioned, made it possible to proceed with contingent improvements in the vicinity, the Pennsylvania to expand the joint main line from two tracks to four, to develop its enlarged right-of-way as a coach and freight yards comprising 28 tracks and the Burlington to complete the rebuilding of its coach yard under a plan that extends the tracks south across the location of the abandoned B. & O. C. T. surface tracks and moves the yard to the west far enough to permit the extension of the two Burlington passenger main tracks north to a direct connection with the Union station tracks at Roosevelt Road, thereby avoiding the use of the Pennsylvania-Alton joint tracks from the former junction to Roosevelt Road. In addition, the Burlington has constructed a new station for suburban train stops some distance west of Union street to take the place of a station maintained for many years at Canal street. This new location is a more convenient one for the majority of the passengers using the old station and, in addition, makes it possible to realize the full advantage of the elimination of the grade crossings. As Canal street is at the foot of a 1.07 per cent grade 1600 ft. long opposing westbound movement, the elimination of stops for any reason at the foot of the grade has permitted of an appreciable shortening of train schedules. Another improvement of marked advantage is the construction of an independent northwest leg for the wye that is used primarily for the turning of passenger trains backed out of the Union station, the west bound main track of the Burlington having been formerly used as a part of this wye.

Many Types of Construction

The old Canal street viaduct was replaced by a deck structure of steel girders encased in concrete and supported on steel bents and concrete abutments, the bents being placed in various skewed positions to accommodate the curved tracks of the Burlington. No such simple statement can be used to characterize the two railway viaducts for these embody an unusual combination of structural types adopted to meet the diverse conditions imposed.

As seen on the layout of the improvements made, nearly all the space under the two structures between Canal street and the river is occupied by tracks, but as

far east as the most westerly track of the four joint Pennsylvania-Alton main tracks, the viaduct tracks are at such elevations that there was ample headroom for seven deck-girder spans, ranging from 58.8 ft. to 87.6 ft. in length, with concrete ballast decks. However, across the Pennsylvania-Alton main tracks and the site of the Pennsylvania coach and freight yards, the head room and span lengths are such that standard deck-girder spans could not be used. This distance of 511 ft. is spanned by four through-girder spans ranging from about 60 ft. to 71 ft. in length, three special shallow deck-girder spans of 57 to 58 ft. and a through-girder span of about 66 ft. flanking the river bridges. The shallow deck-girder spans were an expedient to permit of a scissors crossover between the tracks on the two viaducts. These spans all have ballast floors.

Novel Expansion Joint

Special features were introduced into the through-girder spans because of the type of substructure used. To permit of the maximum number of tracks in the Pennsylvania yard, only four masonry piers were employed, the remaining supports being provided by steel rocker bents, namely three for the intermediate supports for the through-girder group and two in the deck-span group. In the former, an expansion joint introduced between the ends of the two center spans, which are supported on a rocker bent, was developed in an ingenious manner. The girders of one span have a full bearing on the columns while the girders of the other span are supported on these by means of a "half-lap" joint, the bearing of each expansion-end girder being provided with an Alemite-lubricated shoe where it rests on a horizontal offset in the end of the fixed-end girder. Because the "half-lap" arrangement of the adjoining girders had the effect of cutting the effective depth of the girders over the bearing by one half, it was necessary to reinforce the ends of the fixed-end girders with large rectangular steel castings that were riveted against each side of the web and spliced to the bottom flange, heavy ribs on these castings taking the place of end stiffeners. The through girders have a floor consisting of transverse I-beams encased in concrete. These beams are 27 in. deep except that near the ends of each span two heavy 24-in. beams were substituted to permit of a depression or trough in the top surface to carry water to a cast-iron drain head with a soil-pipe connection.

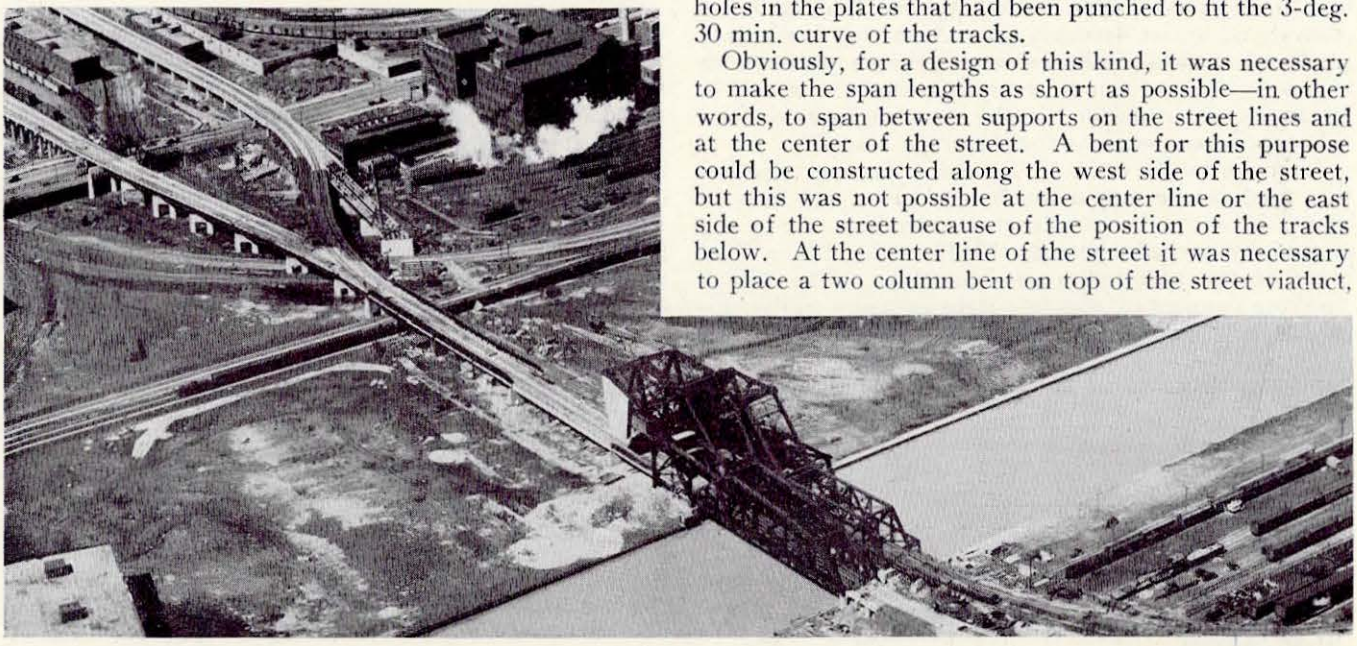
Deck girder spans west of the Pennsylvania tracks are nearly all skewed to accommodate the curved tracks below. The joint-track structure spans have two girders to a track and those in the B. & O. C. T., three. Both structures have reinforced concrete ballast floors.

The B. & O. C. T. crossing of Canal street consists of two 41 ft. 7-in. through spans of four girders each with a floor of encased I-beams framed between the girders. This structure has a total floor thickness of 3½ ft. to base of rail. However, it was in the crossing of the joint-tracks over Canal street that the most difficult situation was presented, since the established summit elevation allowed a floor thickness of only 2 ft. 6 in., obviously an extreme minimum for 40-ft. spans, with the added requirement of a waterproof deck, and the complication that the tracks are on both a horizontal curve of 3 deg. 30 min. and a vertical curve between grades of 1.44 per cent and —1.87 per cent.

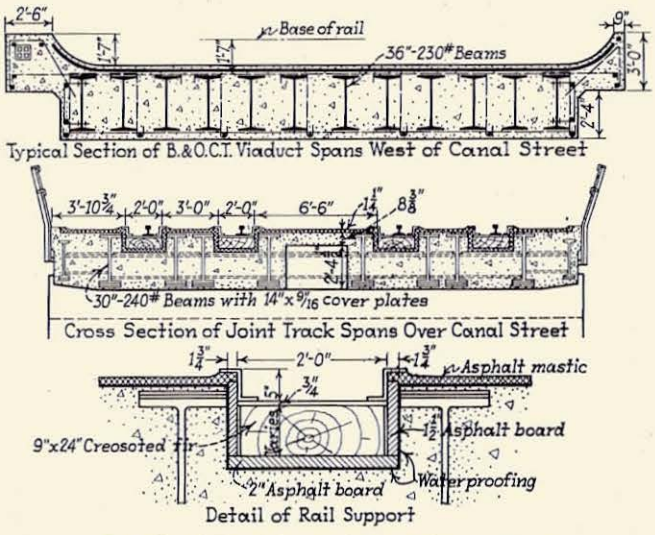
An Unusual Bridge Floor

The structure developed to meet these conditions is an unusual one. The main members are eight 30-in. 240-lb. beams, with two 14-in. by 9/16-in. cover plates both top and bottom. These beams are placed in pairs, 3 ft. 6 in. center to center, symmetrical about each rail and are held together by diaphragms spaced about 8 ft. center to center. This steel structure was encased in concrete with a trough 2 ft. 3½ in. wide by 1 ft. 1⅝ in. deep at the location of each rail. After a membrane waterproofing had been placed on top of this concrete encasement and these troughs had been lined with 2-in. asphalt boards, to protect the waterproofing, 9-in. by 24-in. creosoted fir timbers, which had been preframed to conform to the vertical curve of the tracks, were placed flatwise in these troughs. The timbers were then covered with a ¾-in. steel plate flanged with a Z-bar along each side to protect the asphalt boards and provide an overhang for the top surface waterproofing. The rails were spiked to the timbers through square holes in the plates that had been punched to fit the 3-deg. 30 min. curve of the tracks.

Obviously, for a design of this kind, it was necessary to make the span lengths as short as possible—in other words, to span between supports on the street lines and at the center of the street. A bent for this purpose could be constructed along the west side of the street, but this was not possible at the center line or the east side of the street because of the position of the tracks below. At the center line of the street it was necessary to place a two column bent on top of the street viaduct,



An Air Plane View During Construction. This Shows the Stage of the Work When the B. & O. C. T. Viaduct Had Not Been Completed to the River Bridge and Trains Were Being Diverted to the St. Charles Air Line Bridge Over a Temporary Connection. (The Shaded Part of the Structure)


Base of rail
36"-230# Beams
Typical Section of B.&O.C.I. Viaduct Spans West of Canal Street
30"-240# Beams with 14"x9/16 cover plates
Cross Section of Joint Track Spans Over Canal Street
Asphalt mastic
9"x24" Creosoted fir
Asphalt board
2" Asphalt board
Waterproofing
Detail of Rail Support

Details of Two Types of Floor Construction

with one column bearing on the north abutment and the other on the adjoining bent, while at the east street line it was necessary to support the span over the east half of the street and the adjacent span on a cross girder in the plane of the street line that was designed as a continuous beam over three supports. These supports are in the form of isolated cylindrical concrete columns, two of which are entirely independent, the other being constructed as an extension of a bent under the Canal street viaduct.

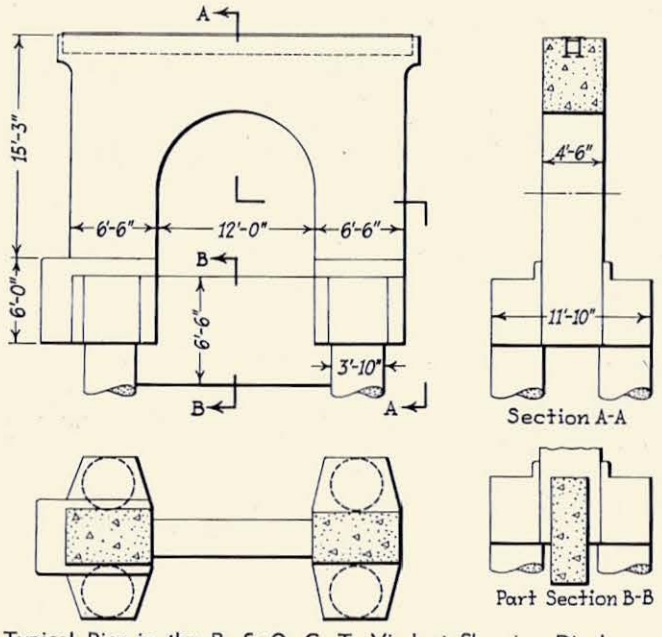
Steel Bracing in Concrete Viaduct

West of Canal street the runoff construction consists of both viaducts and embankment and one of the most unique structures is the viaduct for the joint tracks. It is a reinforced concrete structure with two-column bents 25 ft. center to center (except across Jefferson street where the spans are 29 ft.) supporting built-in-place slabs. Owing to the traction and braking forces that will be constantly imposed on the structure by reason of the steep track grade, and the height of the structure and the depth to stable foundations, resort was had to an unusual type of longitudinal bracing for a concrete structure—namely, the X-bracing commonly employed in steel viaduct towers. Gusset plates, with angles riveted to them to serve as anchors, were set in the forms and embedded in the concrete bents to provide column connections for the angle braces.

Although the B. & O. C. T. viaduct is lower, the design used is one employing longer spans and heavier bents; in fact, the substructure members are piers, pierced by arched openings 17 ft. wide, rather than bents of the post-and-cross-girder type. The superstructure consists of concrete slabs encasing twelve 36-in. 230-lb. beams. The beams are covered with 3 in. of concrete over both top and bottom flanges, except that the bottom flanges are exposed over the piers so that the beams bear directly on the top flanges of 18-in. 75-lb. I-beams imbedded in the pier top to serve as bearing shoes.

The embankment portion of the B. & O. C. T. approach is supported on the south side by a mass concrete wall on natural foundation and the small amount of wall required on the north side consists of concrete cribbing. The joint track embankment, on the other hand, is retained on both sides by Federal-American crib walls. These walls, which have a maximum height of about 14 ft., are supported at the front and rear on built-in-place concrete footings except that the rear footings were omitted where the wall height is less than 6 ft. The batter of these walls is 1¾ in. to the foot.

Foundations for all structures were carried to rock by the Chicago (open caisson) method at elevations

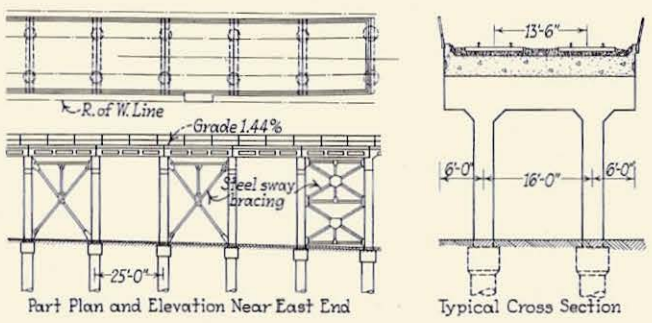


Typical Pier in the B. & O. C. T. Viaduct Showing Diaphragm To Take Longitudinal Thrust

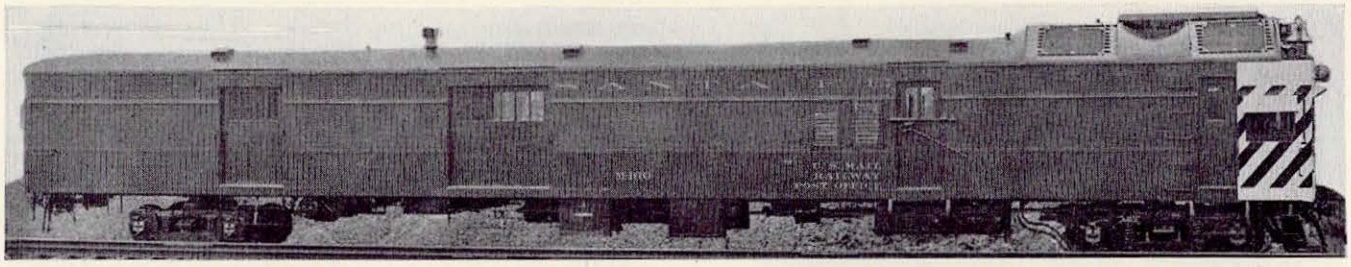
ranging from Elevation minus 35 at the Chicago river to a maximum depth of minus 35 in the viaducts west of Canal street. Longitudinal forces were effectively disposed of in the joint-track viaduct west of Canal street by the tower bracing previously described. In the corresponding B. & O. C. T. structure the pier footings are of two types. Piers carrying expansion bearings are supported on two caissons 3 ft. 10 in. in diameter while piers carrying fixed-end bearings have a pair of caissons under each end, spaced 8 ft. center to center, on which the pier is supported by means of heavy double-cantilever reinforced concrete footing beams that project 3 ft. 8 in. beyond the sides of the pier. Thus the pier has a base width of 11 ft. which is ample to take care of eccentricity of the laods. Longitudinal forces are resisted by soil bearing against a longitudinal diaphragm introduced between the two caissons and the superimposed footing beams, to a depth of 9 ft. below the surface. Similar construction was employed for the piers under the structures east of Canal street.

The construction schedule and temporary track changes had to be coordinated with that for the work on the two Chicago River bridges. The St. Charles Air Line bridge was transferred to its location over the new channel concurrent with the grade separation work.

(Continued on page 251)



Sketch of a Part of the Reinforced Concrete Viaduct



One of the 80-Ft. Baggage-Mail Cars Equipped with a Brill 535-Hp. Power Plant

Santa Fe Gets Fourteen New Gas-Electric Cars

Automatic train control applied to three passenger-carrying cars which operate in train-control territory

WITH this year's equipment, the Atchison, Topeka & Santa Fe has purchased and recently placed in service, 14 gas-electric cars, bringing equipment of this kind now operated by the Santa Fe up to a total of 48 cars. The new cars, which replace steam trains mostly on branch-line runs, have been installed with the idea of providing improved passenger service. They are notable for unusual length, six of the cars being 80 ft. long, and for the fact that three of the passenger-carrying cars are equipped with a complete application of continuous three-speed automatic train control, with cab signal indications the same as provided on steam locomotives in train-control territory.

As shown in the table, 12 of the cars are equipped with the Electro-Motive Company's 400-hp. power plant. They were built by the Pullman Car & Manufacturing Corporation. Two cars, equipped with the Brill 535-hp. power plant, were built by the J. G. Brill Company. Each of the cars contains a 15-ft. mail compartment and four of them are designed with coach and smoking compartments aggregating 26 ft. 6 in. of car length. The latter cars have vestibule-type ends.

The new Santa Fe gas-electrics are of all-steel construction, built to as light a design as consistent with ample strength. Aluminum was used in the roofs, conduits, conduit fittings, power plant accessories and other portions to reduce weight. Cast-steel platforms are provided for supporting the power plants. The trucks are of the four-wheel, cast-steel type, power trucks having 6-in. by 11-in. journals and 36-in. rolled-steel wheel, and rear trucks 5-in. by 9-in. journals with 30-in. cast-steel wheels.

The engine-rooms are arranged for convenience of the operator in handling the cars, and all controls, gages and air-brake equipment are neatly arranged below the window sill for easy access and observation. The bell ringer and whistle valve, as well as electric switches, are applied within easy reach of the operator.

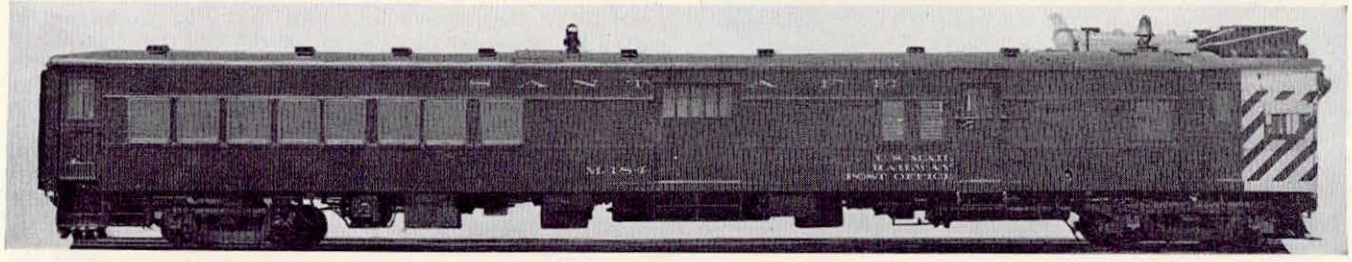
Thought was given to provide vision around the front of the car, a rear vision mirror being applied so that the operator has an unobstructed view to the rear. Shatterproof glass is provided in the front center windows, at the side and front of the operator and in the windshield. The motor-exhaust design and ventilation features in the cab keep out fumes so that the engine-room will be as comfortable as possible. This was accomplished by applying a specially-designed shroud around the exhaust pipes and ventilators in front of the operators and in the center and rear side of the engine-room. Convenient lockers are available for keeping tools, instruction books, fusees, torpedoes, and extra spark plugs.

The postal sections in the cars are regulation railway post-office sections, 15 ft. in length, and are well ventilated. The baggage-rooms are arranged for maximum space, the heater, toilet facilities, drinking water and desk all being located at the side center of the car to take up the least space and leave the remaining portion

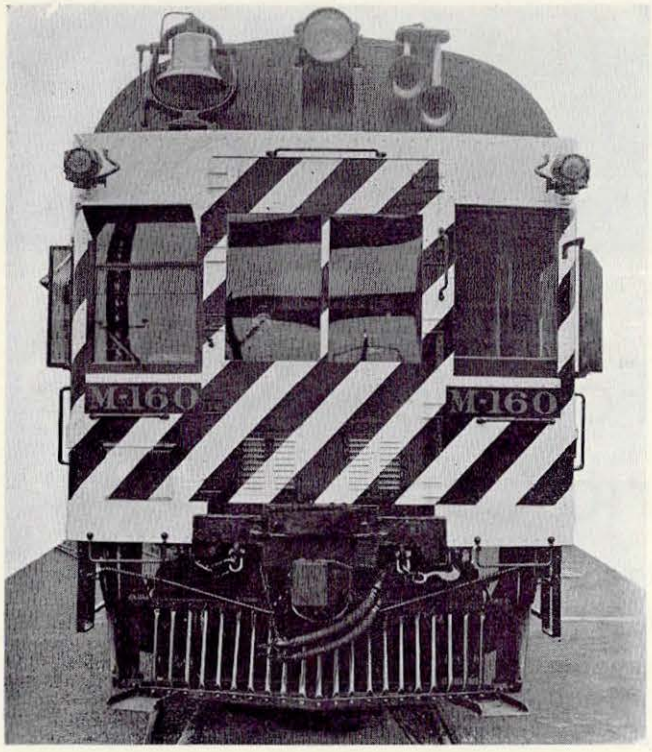
Gas-Electrics Recently Placed in Service on the Santa Fe

Number of cars	Kind of power plant	Type of car, compartment length	Total car length	Total weight
4	Electro-Motive 400 hp.	Coach-Smoker (26 ft. 6 in.)—Mail (15 ft.)—Bagg. (19 ft.)	80 ft.	141,000 lb.*
8	Electro-Motive 400 hp.	Baggage (43 ft. 4 in.)—Mail (15 ft.)	75 ft.	134,000 lb.
2	Brill, 535 hp.	Baggage (48 ft. 3 in.)—Mail (15 ft.)	80 ft.	135,700 lb.

* 139,300 lb., without train-control equipment.



Santa Fe 80-Ft. Passenger-Baggage-Mail Car Equipped with 400-Hp. Electro-Motive Power Plant



A Gas-Electric which Motorists Can "Hear"

for express and baggage space. A special air intake, applied in the baggage-room to provide clean air for the air compressor is easily accessible for cleaning. The passenger, baggage and postal sections are well-lighted. All cars are equipped with hot-water heat, storm sash being available for winter use.

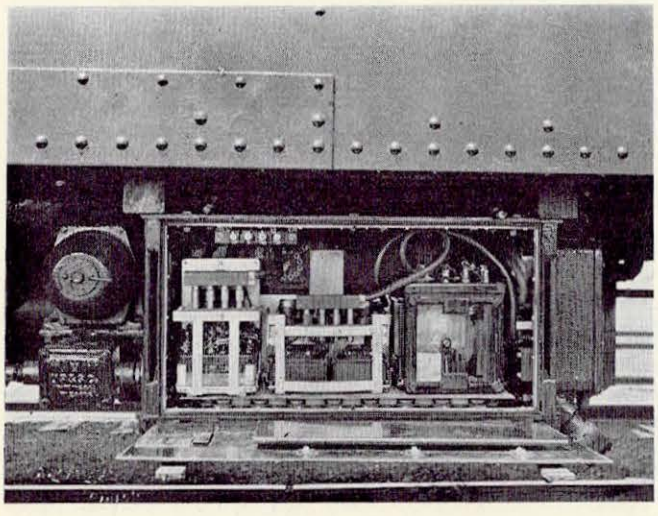
Four of the cars, as shown in the table, are arranged for the accommodation of passengers. There are 10 seats in each smoking compartment and 18 in each coach section. Thought was given in the design of these compartments to provide the most comfort for passengers. The seats are of the semi-bucket type with deep cushions and backs, seating two persons on each side of the aisle with ample space between them. Seats applied in the smoking section are upholstered in leather and those in the passenger compartment with plush patterns of pleasing design.

The smoking section, as well as the passenger compartment, are provided with toilets having flushing hoppers, wash-stands and towel racks. The passenger compartment is finished in a light-green color with light-colored ceiling to match. Each passenger compartment has an electric ceiling fan and electric lights arranged to give maximum light. Two water coolers with cup-vending machines and suitable light-baggage and parcel racks have been applied. The floors of the cars are of wood, a strip of checked linoleum covering the aisleway in each passenger compartment.

As the cars are used largely on branch lines and away from the larger terminals, they are lacquered on the exterior so that they will be easier to keep clean. The front ends of the cars are painted with wide white and black stripes to attract the attention of automobile drivers on the highways, since these cars do not make as much noise as steam trains. The cars are also equipped with loud-sounding air horns and exceptionally large locomotive warning bells with pneumatic air ringer.

These cars are all equipped with the Type ET air-brake equipment, including a brake pedestal; also, with the deadman's foot control. The handbrake equipment is a high-power geared brake, wheel-operated and located in each end of the car.

All cars have friction-bearing journal boxes, except the three cars with train control; these cars have anti-friction bearings on the journals of the front wheels of the trailer truck. All of the cars will haul trailers when needed.



Equipment Box on One of the Passenger-Baggage-Mail Cars with Cover Removed Showing Train-Control Details

Affirms Railway's Right To Protect Its Revenues

(*Continued from page 240*)

favorable grant to an applicant would create such a monopoly over transportation in the territory as would prevent competition; whether the granting of a new certificate, over the protest of an existing transportation company, would probably result in such ruinous competition as would impair or jeopardize the public service; whether in case of two or more applicants for a route, all other things being equal, one applicant possesses a much greater degree of financial responsibility than the other; and whether, in the same situation, the operation by one company would create a greater burden upon our public highways than would the operation of other companies applying for the same route.

The record discloses that the Pennsylvania Railroad, of which the Transit Company is a subsidiary, has for a long term of years been furnishing interstate and intrastate railroad transportation along this route; that the purpose of the Transit Company's application is to supplement railroad service by co-ordination of that service with intrastate bus operation from Steubenville to the Indiana line. The commission stated in the majority opinion that the installation of operation by the White Star Bus Line would not injure the Pennsylvania Railroad to any appreciable degree. But it is not disputed that, by reason of the use of private and public motor vehicles, the railroad company has annually suffered diminishing revenues from passenger traffic for a period of years prior to the Transit Company's application for an intrastate route; and there is no doubt that, if the White Star Line should be permitted to occupy this new route along the railroad line, such operation would further curtail the passenger revenues of the railroad company, which the latter now seeks to safeguard by means of bus operations along its line in Ohio.

The court is of the opinion that the commission erred in awarding the certificate to the White Star Bus Line Company; that the Transit Company's amended application for intrastate operation from one state line to the other should be granted. The order of the commission awarding the certificate to the White Star Bus Line Company is unlawful and unreasonable; it is therefore reversed and the cause will be remanded to the commission, with instructions to grant the amended application of the Pennsylvania General Transit Company.

Improvement in Freight Train Performance by 47 Roads

Comparison of operating results for 1923, 1929 and 1930 shows benefits derived from improvements in facilities and equipment

By Henry M. Sperry, Mem. A.S.C.E.

ALTHOUGH 1930 showed a decrease of 12 per cent in freight revenue ton miles as compared with 1929, the official statistics show that in 1930, as in each year since 1923, the railroads set up new records of gross tons per train, average freight train speed, fuel consumption per thousand gross ton miles and gross ton miles per freight train hour. With respect to these particular indices of operating efficiency, each has established a new record in each of the seven years since 1923. With expanding or declining traffic, in good years or bad, the record in each year has shown an improvement over that of preceding years.

The units selected for consideration are sufficiently significant so that this same picture of continuing improvement is also carried out with respect to costs. In its report designated "Operating Revenues and Operating Expenses by Class of Service," the Bureau of Statistics of the Interstate Commerce Commission now shows a column headed "Road freight wages, fuel, supplies and enginehouse expenses" per freight train mile and per freight gross ton mile. The data are shown in this report for the years 1927, 1928 and 1929, but for the purpose of this study the compilation has been carried back to 1923. Just as in the case of the operating statistic-indices mentioned above, these cost figures show a consistent improvement year by year. The operating cost per freight train mile or per thousand gross ton miles has shown a decline in every year since 1920 without exception, the decline in the cost per freight train mile being especially noteworthy because it has accompanied a substantial increase in train-mile productivity. Thus, the gross tons per freight train mile in 1929 were 21 per cent greater than in 1923 but the operating cost per freight train mile was 15 per cent less. A comparison of operating statistics and operating costs of all Class I railways, for 1929 and 1930 with those of 1923 is shown in an accompanying table.

Table Showing Operating Costs and Statistics for All Class-I Roads for 1929 and 1930 Compared with 1923

	Increase or Decrease Compared with 1923	
	1929	1930
Operating Statistics		
Gross tons per train	inc. 21%	inc. 22%
Freight train speed	inc. 22%	inc. 27%
Gross ton miles per train hour	inc. 49%	inc. 54%
Lb. coal per thousand gross ton miles	dec. 22%	dec. 25%
Costs—Selected Items		
Per freight train mile	dec. 15%	(not yet
Per thousand gross ton miles	dec. 30%	available)

What of the Future?

It is the complete consistency of the improvement in railroad operating efficiency and in operating costs that is of outstanding significance and it is a reasonable surmise that if this efficiency could endure through seven eventful years it may be expected to continue further into the future. Some few experts believe that the railroads have now reached the end of a cycle of operating improvement, and that the results already made cannot readily be further improved upon. There may be reason in their argument but the weight of evidence, as thus presented in the foregoing outline, appears to controvert them—in other words, to indicate that still further progress is possible and probable.

The way to determine what may be expected is to analyze the present trends in some detail. For one thing, the figures up to 1930 cannot, through the very nature of things, have reflected the full improvement in operating efficiency that has been made possible through the railroads' elaborate capital expenditure program of 1930. Many railroads have completed important grade revision or realinement projects during the last few years, outstanding examples of which are the Missouri Pacific's improvement of its line between St. Louis, Mo., and Jefferson City and the Burlington's large project of a similar character on its Twin Cities line. The locomotive builders are said to be disappointed with respect to orders for new locomotives, but the columns of the *Railway Age* are nevertheless fairly well sprinkled with stories of striking improvements in operation due to new power on important divisions on many roads. The writer believes that he can also point to an interesting record of performance in the speeding up of freight service attributable to the use of automatic block signals which, judging by the record of eliminating train stops and cutting down unnecessary delays, enable heavier freight trains to move faster with substantial savings in cost.

Main Lines Only 47 Per Cent Signaled

Progress in equipping railroads with automatic signals has been rapid during the past few years, particularly since operating officers have come to realize that the purpose of signals is not only to assist in safety of operation but also to increase average speeds by permitting closer spacing of trains and through elimination of unnecessary delays. Nevertheless, while the mileage of automatic block signals has increased substantially (46 per cent) in recent years, it is still a fact that the larger roads of this country have only about 27 per cent of their road mileage equipped with automatic block signals, or only 47 per cent of even their main lines so equipped.

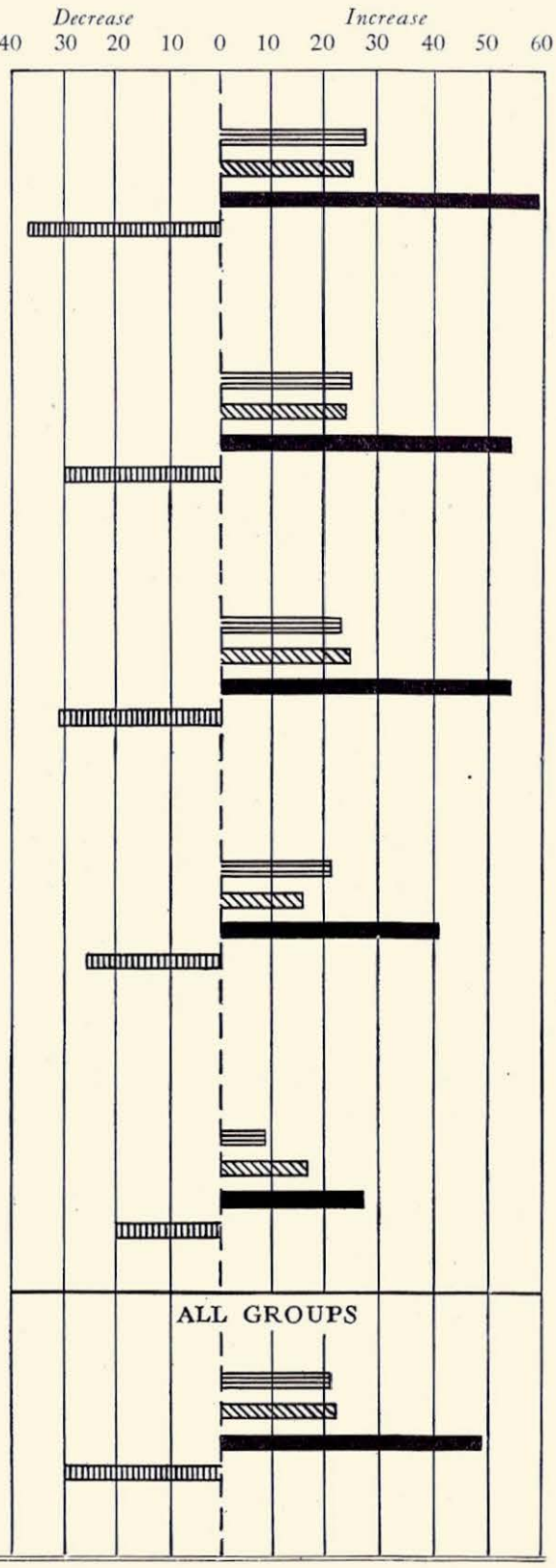
The possibilities of continuing the improvement in railroad operating efficiency through greater use of signaling equipment are made clear in two ways: Through analysis of the results obtained in individual installations, as outlined in articles published in railroad magazines as well as in the reports of the Signal Section of

TABLE I—Improvement in Freight Train Performance Averages

1929 Compared with 1923 on Basis of the Ratio of Miles of Automatic Block Signals to Total Miles of Road

Forty-seven Railways with Annual Operating Revenues above $25,000,000

	1929	1923	Per cent. increase
GROUP A—10 Roads with Automatic Block Ratio 30 Per Cent. and Upwards			
Gross tons per train	2,170	1,691	28
Train miles per train hour	13.6	11.0	24
Gross ton miles per train hour	29,608	18,661	59
Cost per 1000 gross ton miles	$0.595	$0.939	*dec.* 37
Ratio of automatic block	50.8	41.7	..
GROUP B—9 Roads with Automatic Block Ratio 20 to 29 Per Cent.			
Gross tons per train	2,109	1,693	25
Train miles per train hour	12.5	10.1	24
Gross ton miles per train hour	26,394	17,149	54
Cost per 1000 gross ton miles	$0.541	$0.775	*dec.* 30
Ratio of automatic block	25.4	17.1	..
GROUP C—10 Roads That More Than Doubled Their Automatic Block Mileage			
Gross tons per train	1,682	1,369	23
Train miles per train hour	14.4	11.5	25
Gross ton miles per train hour	24,281	15,732	54
Cost per 1000 gross ton miles	$0.541	$0.789	*dec.* 31
Ratio of automatic block	27.3	10.0	..
GROUP D—8 Roads with Automatic Block Ratio 0 to 19 Per Cent.			
Gross tons per train	1,618	1,339	21
Train miles per train hour	13.5	11.6	16
Gross ton miles per train hour	21,863	15,520	41
Cost per 1000 gross ton miles	$0.606	$0.817	*dec.* 26
Ratio of automatic block	14.9	13.5	..
GROUP E—10 Roads That Had an Increase of Less Than 10 Per Cent. in Train Load or Train Speed			
Gross tons per train	1,781	1,636	9
Train miles per train hour	13.3	11.4	17
Gross ton miles per train hour	23,730	18,635	27
Cost per 1000 gross ton miles	$0.590	$0.733	*dec.* 20
Ratio of automatic block	26.8	24.5	..
ALL GROUPS—Averages of the Five Groups A–E Summary of the 47 Roads			
Gross tons per train	1,905	1,569	21
Train miles per train hour	13.3	10.9	22
Gross ton miles per train hour	25,399	17,100	49
Cost per 1000 gross ton miles	$0.566	$0.806	*dec.* 30
Ratio of automatic block	27.1	18.9	..



dec. indicates decrease.

TABLE II—Improvement in Freight Train Performance

1929 Compared with 1923

Forty-seven Railways with Annual Operating Revenues above $25,000,000

Basic Data Used in Computing the Train Performance Averages as Shown in Table I

Groups	*Items*	*1929*	*1923*	*Per cent. decrease*
GROUP A	Gross ton miles	185,201,000,000	154,889,000,000	*inc.* 20
	Train miles	85,365,000	91,580,000	7
10 Roads with Automatic Block Ratio 30 Per Cent. and Upwards	Train hours	6,255,000	8,300,000	25
	Cost of freight train wages, fuel, supplies and engine-house expense	$110,159,000	$145,514,000	24
	Miles of road	25,352	25,317	..
	Automatic block miles of road	12,868	10,555	..
GROUP B	Gross ton miles	368,137,000,000	334,487,000,000	*inc.* 10
	Train miles	174,546,000	197,524,000	12
9 Roads with Automatic Block Ratio 20 to 29 Per Cent.	Train hours	13,948,000	19,505,000	28
	Cost of freight train wages, fuel, supplies and engine-house expense	$199,335,000	$259,305,000	23
	Miles of road	56,630	55,882	..
	Automatic block miles of road	14,380	9,540	..
GROUP C	Gross ton miles	186,188,000,000	138,599,000,000	*inc.* 34
	Train miles	110,700,000	101,260,000	*inc.* 9
10 Roads That More Than Doubled Their Automatic Block Mileage	Train hours	7,668,000	8,810,000	13
	Cost of freight train wages, fuel, supplies and engine-house expense	$100,782,000	$109,314,000	8
	Miles of road	46,459	44,608	..
	Automatic block miles of road	12,694	4,388	..
GROUP D	Gross ton miles	139,728,000,000	121,054,000,000	*inc.* 15
	Train miles	86,369,000	90,389,000	4
8 Roads with Automatic Block Ratio 0 to 19 Per Cent.	Train hours	6,391,000	7,800,000	18
	Cost of freight train wages, fuel, supplies and engine-house expense	$84,639,000	$98,947,000	14
	Miles of road	42,041	41,693	..
	Automatic block miles of road	6,272	5,629	..
GROUP E	Gross ton miles	128,429,000,000	127,257,000,000	*inc.* 1
	Train miles	72,114,000	77,804,000	7
10 Roads That Had an Increase of Less Than 10 Per Cent. in Train Load or in Train Speed	Train hours	5,412,000	6,829,000	21
	Cost of freight train wages, fuel, supplies and engine-house expense	$75,723,000	$93,293,000	19
	Miles of road	27,807	27,133	..
	Automatic block miles of road	7,454	6,638	..
ALL GROUPS	Gross ton miles	1,007,683,000,000	876,286,000,000	*inc.* 15
	Train miles	529,094,000	558,557,000	5
Averages of the Five Groups A–E Summary of the 47 Roads	Train hours	39,674,000	51,244,000	23
	Cost of freight train wages, fuel, supplies and engine-house expense	$570,638,000	$706,373,000	19
	Miles of road	198,289	194,633	..
	Automatic block miles of road	53,668	36,750	*inc.* 46

inc. indicates increase.

the American Railway Association and the American Railway Engineering Association, or by comparison of the average results on well-signaled roads with those of roads less completely signaled.

A general analysis has been carried out for the purpose of this article in the form of a comparison of results in 1929 as compared with 1920, checked with a comparison on a slightly different basis as between 1929 and 1923. Both comparisons include the 47 railroads having annual gross operating revenues in excess of $25,000,000 and are outlined in the following: In the comparison between 1929 and 1920, the railroads were grouped on the basis of the proportion of their main lines equipped with automatic block. There were thus three groups equipped with automatic signals in the following proportions: (A) Automatic block signaling on the equivalent to 60 per cent or more of the main line, (B) 30 to 59 per cent, (C) 0 to 29 per cent. The summation of this comparison showed that group A averaged the greatest improvement in 1929 over 1920 in gross tons per train, in train speed and in gross ton miles per train hour. Group B in each unit showed the second best degree of improvement, while group C showed the smallest relative improvement. The details of traffic and signaling are given in greater detail in Table III.

For the reason that there might be some objections to the use of a unit embracing the proportion of automatic signal mileage to *main-line* mileage, the carriers not being in accord as to their various definitions of what constitutes main line, it was decided to carry out the 1929-1923 comparison on a different basis. The other comparison, therefore, is on the basis of the proportion of automatic block to total miles of road. In both of the years chosen, 1929 and 1923 the railroads performed with outstanding excellence. Furthermore, it was possible to bring in an additional factor—that of improvement in cost. The comparison on this basis was, therefore, somewhat more elaborate and possibly more significant.

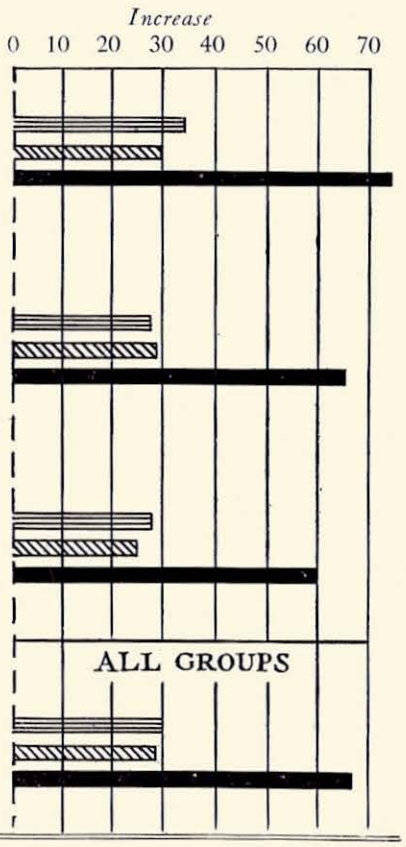
The groups in the 1929-23 comparison were selected as follows: Group A includes 10 roads, over 30 per cent of the road mileage of which is equipped with automatic block; Group B, 9 roads, 20 to 29 per cent equipped with automatic block; and Group C, 10 roads which were separated from their respective groups because they had *doubled* their automatic block signal mileage since 1923, it being believed that a change of this extent warranted separate treatment of such carriers. This group averaged 27.3 per cent equipped with automatic block at the end of 1929. The correlation with the B group (20 to 29 per cent equipped) is noteworthy.

Group D includes 8 roads, 0 to 19 per cent equipped with automatic block, and Group E includes 10 roads, also separated from their respective groups, that had failed in 1929 as compared with 1923 to increase both their average train load or average train speed to the

TABLE III—Improvement in Freight Train Performance Averages 1929 Compared with 1920 on Basis of the Ratio of Miles of Automatic Block Signals to Total *Main Line* Miles of Road

Forty-seven Railways with Annual Operating Revenues above $25,000,000

	1929	1920	Per cent. increase
GROUP A—19 Roads with Automatic Block Ratio 60 Per Cent. and Upwards			
Gross tons per train	2,119	1,579	**34**
Train miles per train hour	13.1	10.1	**30**
Gross ton miles per train hour	27,817	15,943	**74**
Ratio of automatic block	85.6	67.7	..
GROUP B—19 Roads with Automatic Block Ratio 30 to 59 Per Cent.			
Gross tons per train	1,857	1,451	**28**
Train miles per train hour	13.4	10.4	**29**
Gross ton miles per train hour	24,866	15,063	**65**
Ratio of automatic block	43.9	22.9	..
GROUP C—9 Roads with Automatic Block Ratio 0 to 29 Per Cent.			
Gross tons per train	1,613	1,261	**28**
Train miles per train hour	13.6	10.9	**25**
Gross ton miles per train hour	21,952	13,722	**60**
Ratio of automatic block	18.6	13.5	..
ALL GROUPS—Averages of the Three Groups A–C, Summary of the 47 Roads			
Gross tons per train	1,905	1,468	**30**
Train miles per train hour	13.3	10.3	**29**
Gross ton miles per train hour	25,399	15,194	**67**
Ratio of automatic block	47.2	30.5	..



extent of 10 per cent for the reason that through some peculiar circumstances such as loss or a striking change in traffic or other cause deserving of special analysis, these roads had been unable to take full advantage of the facilities at their disposal.

As in the comparison between 1929 and 1920, the comparison between 1929 and 1923 showed that the greatest degree of increase in train load, in train speed, in gross ton miles per train hour occurred in the group most extensively equipped with block signals. The second best degree of improvement was found to be in the second group (20 to 29 per cent signaled) with a strikingly close correlation appearing in Group C, (27.3 per cent signaled) which was shown separately for reasons above indicated. The 0 to 19 per cent equipped group ranked next in order with respect to the improvement in each unit, while the group of 10 roads which had failed to increase both train load or train speed 10 per cent ranked last with the least degree of improvement in each unit. See Table I.

Two Methods Check Each Other

The consistency between the two methods of analysis on widely different bases, and the fact that in every instance the groups grade consistently with the proportion of automatic block, is significant. It indicates that the well-managed road is likely to be well signaled or at least, as indicated in the record of Group C, that the able management has a keen realization of the value of automatic block signaling as an adjunct to efficient operation. It also evidences, particularly when supplemented by the analysis of results on individual signaling installations, that continuance of the improvement in operating efficiency may be expected from the enlargement of automatic block signal mileage or the enhancement of the value of present installations through the greater use of remote control switch machines, or the extension of centralized traffic control.

The Effect on Costs

The comparison of costs is especially significant, for after all the purpose of improvement in operating efficiency is to cut costs. As explained in Table I, the 47 railways showed a reduction in the cost per thousand gross ton miles from 80.6 cents for 1923 to 56.6 cents for 1929, a reduction of 24 cents or 30 per cent. The 47 railways in 1929 produced a total of 1,007,683,000,000 gross ton miles. At a saving of 24 cents per thousand ton miles, this equalled a saving in 1929 as compared with the 1923 basis of operation of $241,843,920 in the out-of-pocket expenses for road freight train wages, fuel, supplies and engine-house expenses.

Decrease in Costs per Thousand Gross Ton Miles 1929 Compared with 1923

	Per cent decrease
Group A—Over 30 per cent signaled	37
" B—20 to 29 per cent signaled	30
" C—Roads doubling amount of automatic block signals in period	31
" D—0 to 19 per cent signaled	26
" E—Roads failing to increase train load or train speed 10 per cent	20

The Effect on Train Loading Apparent

Particularly noteworthy are the figures showing that the greatest average increase in train load has occurred on the roads averaging the greatest proportion of automatic block signals. There is no surer way to save money on a railroad than to increase train load and thereby cut down the total number of trains operated. In this day of improved service to shippers with an increasing proportion of the freight tonnage moving in time or scheduled freight trains, the problem of increasing train loads becomes particularly severe because of the difficulty that heavy trains find in meeting schedules. In this connection, signals assist markedly because, by reducing delays and cutting down the time spent on passing tracks, they allow heavy trains more time in productive motion and make it that much easier to maintain schedules or avoid overtime. On the other hand, it is similarly possible to load scheduled trains more heavily than might otherwise be possible with their faster schedules. Under the conditions, therefore, it seems perhaps natural that signals should be expected to permit both faster and heavier trains and to further the economies that accompany that sort of operation.

Busiest Crossing Is No More

(Continued from page 244)

but the B. & O. C. T. bridge was built at the low level before the grade separation project was agreed on, and while this was of advantage in providing a crossing for the trains using the St. Charles Air Line while the bridge on that line was being moved, it was necessary to introduce into the program a plan for raising the B. & O. C. T. bridge to the elevation necessary to fit into the grade-separation plan.

Until the time for this step, the work on the structures west of the Pennsylvania property proceeded with such shifting of operated tracks as was necessary to avoid interference. It was possible also to complete the joint-track viaduct to the St. Charles Air Line bridge without interference with trains because all traffic was being handled over the B. & O. C. T. bridge while work on that portion of the viaduct was in progress. But for this very reason the B. & O. C. T. viaduct could be completed for only a short distance east of Canal street until the B. & O. C. T. river bridge was taken out of service and traffic on the line approaching it from the west was discontinued.

To meet this obstacle a temporary pile-trestle connection from the end of the completed part of the B. & O. C. T. structure to the joint-track structure just west of the through span over the Pennsylvania-Alton tracks was constructed and all B. & O. C. T. and St. Charles Air line train movements were transferred from the surface to the viaduct by way of the St. Charles Air Line river bridge on April 4. This permitted the B. & O. C. T. surface tracks to be removed to make room for the completion of the viaduct and released the B. & O. C. T. river bridge for the operation of raising it to the new grade.

This project has been financed jointly by the Chicago & North Western, the Chicago, Burlington & Quincy, the Baltimore & Ohio Chicago Terminal and the Pennsylvania. Following an agreement among these railways covering the general features of the project, a special engineering staff was organized to carry out the details of design and the construction for all four roads. This organization is under the direction of G. A. Wiegel, special engineer, Chicago, Burlington & Quincy. L. W. Skov, formerly office engineer of the Burlington bridge department, is special engineer of design of structures, all plans being subject to the approval of the chief engineers of the participating roads. All concrete and foundation work and grading has been done by the W. J. Newman Company of Chicago, while the steel erection was done by Overland Construction Company, also of Chicago.

Portland Hearing On Rate Rise Ended

"RAILROAD management, railroad employees and railroad shareholders cannot expect to receive alms from empty hands" was the stand taken by W. Gerald Holmes, industrial engineer of the New England Public Service Corporation, at the final session of the New England hearing on the proposed 15 per cent freight rate increase at Portland, Me., on August 6. Mr. Holmes declared that the whole country is suffering from the depression, that poverty and suffering are widespread, and that an increase of freight rates at this time would disproportionately raise the cost of living in many parts of the country.

"Clearly," he said, "such a distortion of real wages would amount to no more and no less than a subsidy to railroad bondholders, stockholders and employees at the expense of those similarly situated with respect to other business enterprises." A percentage increase of freight rates, he asserted, would seriously disturb the unit cost competitive relationships of industry, would eliminate many producers from their established markets, would alter the economic value of plant locations in every part of the country, and in New England, added to the effects of the Eastern class rate order, would mean no less than a confiscation of property.

An unfair burden upon Maine [illegible] as compared with competitors in localities [illegible] markets and fertilizer sources, would be imposed by an increase upon fertilizer rates into Maine and rates on produce in the other direction, Commissioner Frank P. Washburn of the Maine Department of Agriculture held. It would also serve to narrow the field for Maine canned vegetables and fruits.

The possibility that the plant of the Norton Company at Worcester, Mass., might be forced to move to the midwest in order to compete successfully with other manufacturers of grinding wheels was indicated by Benjamin Curtis, traffic manager for the company, which employs from 2,000 to 3,000 people and has plants and warehouses in various parts of the country. The new Eastern class rate increase together with the 15 per cent increase would mean an increase in freight rates for this company of over 30 per cent.

Approximately 7,000 cords of pulp wood consigned to the Penobscot Chemical Fibre Co., next winter, will be diverted to trucks, if the rate increase is allowed, W. V. Wentworth of that company declared. He said that a decrease of 15 per cent in pulpwood rates would give to the railroads at least 5,000 cords of the 11,000 which will be transported by truck under present rate conditions, thus making a difference of 12,000 cords to the railroad between what they would receive if the rate were decreased and if it were increased. Much pulp wood would go to the trucks and much more would go by vessel and by floating, if the increase is allowed, according to this witness.

Walter A. Powers, attorney representing the Maine Lumbermen and Land Owner's Association, entered a formal protest against an increase. R. E. Shaw, of the Mason Manufacturing Co., South Paris, Me., also entered a protest, stating that in the event of an increase it might be found necessary to move the plant, which is one of two in that town manufacturing toys and children's furniture, to Massachusetts or Pennsylvania to compete with similar concerns operating from those districts.

N. B. Woodsum appearing from the Berst-Foster-Dixfield Co., manufacturers of hardwood novelties protested the increase, Louis C. Stearns representing the Madawaska Lumber Co., entered a protest, and James H. McCann, assistant traffic manager for the Associated Industries of Massachusetts, also spoke against an increase, but said that if one were decreed a flat rate would be preferable to a percentage. C. E. Hussey, a farmer of Presque Isle was the last speaker to be heard as the Portland hearing closed early in the afternoon of August 6.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended August 1 amounted to 757,293 cars, an increase of over 15,000 cars as compared with the week before but a decrease of 162,488 cars as compared with the corresponding week of last year and of 348,627 cars, or 31 per cent, as compared with 1929. Loading of livestock showed an increase of 1,587 cars as compared with last year but all other classes of commodities showed reductions. The principal increase as compared with the preceding week was in coal loading, which amounted to 119,656 cars. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Districts	Week Ended Saturday, August 1, 1931	1930	1929
Eastern	176,206	203,165	249,980
Allegheny	144,689	183,383	226,566
Pocahontas	45,268	52,828	60,701
Southern	106,845	120,043	143,076
Northwestern	103,755	146,256	176,251
Central Western	115,074	141,561	165,907
Southwestern	65,456	72,545	83,439
Total Western Districts	284,285	360,362	425,597
Total All Roads	757,293	919,781	1,105,920
Commodities			
Grain and Grain Products	50,686	62,710	75,062
Live Stock	19,307	17,720	21,609
Coal	119,656	137,633	159,470
Coke	4,808	8,542	12,359
Forest Products	27,311	41,428	67,758
Ore	35,196	58,105	74,309
Mdse. L.C.L.	213,017	234,392	259,957
Miscellaneous	287,312	359,251	435,396
August 1	757,293	919,781	1,105,920
July 25	741,752	919,301	1,102,553
July 18	757,555	928,271	1,079,968
July 11	763,581	915,985	1,066,414
July 4	667,879	792,053	911,143
Cumulative total, 29 weeks	22,668,044	27,675,967	30,882,951

The freight car surplus for the week ended July 23 averaged 568,594 cars, a reduction of 2,816 cars as compared with the week before. The total included 285,354 box cars, 217,417 coal cars, 27,983 stock cars, and 14,180 refrigerator cars.

Car Loading in Canada

Revenue car loadings in Canada for the week ended August 1 totaled 45,995 cars, a decrease from the previous week of 807 cars and a decrease from the same week in 1930 of 12,095 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
Aug. 1, 1931	45,995	22,458
July 25, 1931	46,802	22,042
July 18, 1931	47,966	22,311
Aug. 2, 1930	58,090	27,979
Cumulative Totals for Canada		
Aug. 1, 1931	1,489,829	831,781
Aug. 2, 1930	1,825,410	1,062,746
Aug. 3, 1929	2,054,520	1,296,942

The Division Superintendent a Man of Diversified Duties

Reports presented at recent convention illustrate variety of demands on this officer

Part V

THAT the division superintendent is a man of many activities was illustrated by the topics covered at the convention of the American Association of Railroad Superintendents at St. Louis on June 9-12. The diversity of these duties is illustrated in three reports presented at the convention, one of which dealt with the present-day problem of handling merchandise shipments, another with the complications in meeting highway and air competition, while a third evaluated the duties of the division superintendent as seen by their own number. These reports, which are abstracted below, supplement reports of the convention which appeared in the *Railway Age* of June 20, July 4, July 18 and August 1.

Handling Merchandise

The problems which arise in the handling of merchandise shipments, which vary necessarily with the distance the shipments are to be transported, the volume of business and local conditions, were discussed by a committee of which T. M. Flynn, division superintendent of the Northern Pacific at Minneapolis, Minn., was chairman. The committee considered the handling of merchandise under three headings: (1) Territory which can be served by local way freights out of the loading point or distributing center; (2) territory beyond local way freight limits which can be reached by merchandise or time freight trains in time for early next-morning delivery, and (3) territory beyond the possibility of early next-morning delivery. The report continued:

Competition Keenest in First Zone

It is in the first zone that the competition of common carrier highway trucks is most keenly felt. With truck lines providing store-door pick-up and delivery service and early next-morning delivery, a large l.c.l. tonnage formerly handled by rail is being diverted to highway trucks. Until shipments by rail can be given store-door pick up and delivery service, the carrier is at a disadvantage in meeting truck competition.

One road which organized a motor transport service with store-door pick-up and delivery service to regain business lost to the trucks, reports that the results have been very gratifying, particularly between the larger cities. Merchandise shipments between two of the cities increased about 15 per cent and some of the short haul l.c.l. freight was regained. At one time 36 highway trucks were operating between two of the larger cities whereas since the inauguration of this service, the number has been reduced to 12 and these are operated by wholesale concerns, which, in all probability, will discontinue their operation when the trucks require replacement. Another line, since organizing motor transport service, has found that it can compete successfully with regulated highway truck lines on the basis of service and equal rates. A check of the shipments received shows that approximately 85 per cent of the tonnage of the transport company is made up of freight recovered from competing motor trucks.

Shipments for this zone can be handled to the best advantage by the establishment of motor transport service, dependent of course, on the volume of business. When motor transport service is not considered advisable as a matter of policy, or where permission to operate cannot be secured from state commissions, the next best method of handling merchandise is by local way freight trains, except to points where the traffic justifies the loading of set-out cars, which are handled in through merchandise or time freight trains.

Handling on Local Passenger Trains

When handled by local way freights the train schedules should be rearranged when necessary to provide the expedited service. On one line, a study of a local schedule on a 140-mile district showed that the local passenger train could be maintained by making it a mixed run, handling l.c.l. merchandise on a 6-hr. 30-min. schedule. This arrangement resulted in expediting the handling of merchandise shipments materially.

Another railroad found it necessary, because of state laws and public opinion, to operate a limited number of passenger trains on branch lines where business for seven or eight months in the year was very light. A study indicated that l.c.l. freight business could be handled by loading shipments for the branches in as few cars as possible, adding freight brakemen and distributing the freight daily by local passenger trains. As a result two truck lines discontinued operation and branch line local freight service was reduced to bi-weekly trips to handle carload business, with a marked saving in operating expense.

In some localities where merchandise traffic is handled largely by trucks, daily local service each way has been discontinued and tri-weekly service substituted. Where the shipments necessitated every-day delivery, merchandise was loaded at the distributing center in reverse order every second day, forwarded by time freight trains to the distant terminal and distributed on the return trip of the local, thus providing daily service.

Night Way Freight Trains

To meet truck competition in this zone, some roads are operating night way freight trains with early next-morning delivery. These runs usually start from distributing centers where it is possible to operate the train after freight stations close, deliver shipments at intermediate points and reach the distant terminal on the following morning. There is a considerable difference of opinion about the operation of these trains. One

road asserts that considerable business has been recovered from common carrier highway truck lines and that a friendly feeling has been created among patrons, and it is its conclusion that the night operation of these trains is advantageous. Another road in the same territory, after trying night way freight operation, discontinued the service. The early morning delivery of ordinary box car merchandise met with the approval of the patrons, but the handling of perishable shipments was not satisfactory because of damage resulting before delivery could be effected. The movement of outbound carload shipments at intermediate points was not entirely satisfactory because of the delay in forwarding cars after they were loaded.

Both lines found the operation more expensive. Switching operations were retarded and night operation was not found to be as satisfactory as the same operation performed during the day. Among the disadvantages were overtime accruing to station forces which met trains outside of assigned hours, the difficulty in moving the local train against opposing trains because of telegraph offices closed at night, and the irregularity of schedule maintained by trains performing local service at night. The advisability of handling merchandise by night local way freights can only be determined by a study of individual conditions.

Second Zone Movement

The second zone covers the territory which cannot be served expeditiously by local trains out of the loading point but which can be reached by merchandise or time freight trains in time for early morning delivery of shipments. This zone can best be served by the operation of preference merchandise trains where the number of cars justify the service and existing time freights cannot handle the cars without too great delay in setting out. This service makes early next-morning delivery possible to points where set-out cars can be loaded and also expedites the movement of cars handled by local way freight trains operating out of terminals some distance from the loading point. One railroad reports a considerable increase in business at a point 250 miles from the loading point after the establishment of this service, freight in this case being delivered not later than 9 a. m. following the day of loading.

Third Zone Requires Special Schedules

The third zone covers territory beyond the possibility of early next-morning delivery. The most efficient method of handling appears to be by the operation of merchandise cars on preference or time freight schedules.

In each of the three zones mentioned, careful consideration of schedules is necessary if expedited service is to be provided. This involves a close study of the time that cars are ready for pulling at freight houses, team tracks and other points in the originating terminal and the assignment of a sufficient number of yard crews to expedite the movement of this freight from its various sources to the classification yard or dispatching point soon after the closing hour for the receiving of freight.

The minimum time necessary for assembling and classifying at the classification yard should be computed and the leaving time of the train determined, the originating terminal building up solid trains for distant destinations so far as possible, to avoid intermediate yarding. When there is not enough freight for the movement of solid train loads to distant destinations, freight should be blocked for the several destinations to reduce to a minimum the time at intermediate set-off points or terminals.

The next step should be a close study of the minimum running time over the several divisions and through intermediate terminals. A close computation should be made of the time required at terminals for reclassification, inspection, change of locomotives and crews, and a definite allotment of time set up over each division and through each yard. After setting up the schedule, it is needless to say that trains should be given very close supervision and every effort should be made to maintain it as arranged.

Expedited handling on the road must be accompanied by the prompt placement of merchandise cars for unloading and reworking at destination. At large terminals many roads have found that the working of a night force, and in some cases a Sunday force, expedites the handling of merchandise to make it available for delivery when the freight station opens. The forwarding of way bills by passenger trains to reach their destination in advance of the cars also expedites the delivery of shipments. Where shipments are interchanged between carriers at terminals, many roads are handling them by truck between freight stations, resulting in a considerable saving of time in transit—in some cases as much as 24 hr.

Some lines are also taking advantage of the use of the truck at large stations, in lieu of trap car service. At points where there are outside receiving stations and transfer platforms the shipments are received and trucked to the outbound freight station, at a saving in the cost of handling. The movement of freight is also expedited and equipment is conserved by heavier loading.

This report was received without discussion.

Highway and Air Competition

A committee of which M. F. Steinberger, manager of highway transportation, B. & O., Baltimore, Md., was chairman, presented a very thorough report on the increasing use of motor coaches, trucks and airplanes, and the effect of these new forms of competition on the railways. In opening its report, the committee presented statistics showing that, notwithstanding the depression throughout the country during 1930, the highway carriers were able to increase their business over that of the very prosperous year of 1929, while railway traffic continued to decline at an even greater rate than in previous years. Some opinions were also presented as to the corrective steps which the railroads should take with a view to retaining to themselves the traffic which normally accrues to them. With respect to these corrective steps, the report said in part:

The railroad companies should adopt the theory that they are not exclusively railroads, but are engaged in the business of furnishing transportation. If this is accepted as the function of a railroad organization, then it follows that that organization should adopt that vehicle which will provide the most economic method of transportation of persons or freight between any two points; or that kind of transportation which the public indicates it desires to use. Carried still further, this means that these transportation media, known as railroads, should, when policy or necessity demands, use the rails for steam, gasoline or fuel-oil-operated units for the transportation of passengers and freight, and the highways for similar purposes in the economic sphere of the vehicle designed for highway operation, or use the airplane where the demand for speed is apparent and outweighs other considerations of cost and, possibly to some degree, of safety.

In order that the railroads may find the economic

ranges in operation for these various vehicles, or in order that any other transportation agency may find these economic limits, these interests should first continue their efforts to secure interstate regulation of highway buses in so far as the securing of certificates, financial responsibility, a firm rate basis, hours of service, maintenance of schedules, safety devices, and the right of railroads to engage in bus transportation, are concerned. Coincident with this, state legislatures should be urged by all proper means to enact legislation covering equality of taxes, sizes and weights of vehicles, and road regulation.

Second, it would seem desirable that the railroads should prepare and disseminate information with respect to taxes, damage to highways, relation of railroad expenditures to the business life of communities, through newspapers and popular magazines, and railroad officers qualified by knowledge of the subject should address civic organizations directly or the general public over the radio in order that the public may be acquainted with the true facts, and have a true picture of the railroads' actual position in the matter of highway transportation.

The committee quoted from the statement of the Association of Railway Executives, outlining the position of the railways with respect to motor transportation. It then continued:

Reduced Fares

It is the feeling of this committee, and apparently the feeling generally, that the principal competitor of the railroads in so far as passenger traffic is concerned, is the private automobile, and there would appear to be little possibility of persuading the public in general to abandon their private cars in favor of the railroad. In an endeavor, however, to secure the return to the railroads of that portion of the business which has gone to motor bus lines, certain railroads have made some experiments with reduced fares in day coaches. These experiments have been so scattered and so recent that little or no information has been secured as to their success. However, there are different schools of thought on the subject, one of which believes that the loss in gross revenue resulting from a general reduction in coach fares, to about two cents per mile, would not be compensated by a sufficient increase in business to justify the reduction. On the other hand, the second school of thought holds that, inasmuch as low cost appears to be the prime consideration with the bus users, the reduction would result in the return to the railroad of a large portion of this bus travel.

While the members of the committee have individual opinions on this subject, it is not felt desirable to express a committee opinion or recommendation. It may be said, however, that it is doubtful whether the rate of fare has much to do with the use of buses for the relatively short hauls, inasmuch as that appears to be largely a matter of convenience, frequency of service, and what might be called store-door delivery of passengers.

Generally speaking, it is felt that the railroad companies can well afford to inaugurate such short-haul bus services as will permit of the elimination of or reduction in steam train service, and give a more frequent and flexible service than can be given by rail, the bus service to be given costing not more than 30 cents per mile against a rail cost of 85 cents to $1.00 per mile. It is further felt that the railroads should recognize the fact that there is a demand for an inferior long-distance service, as compared with rail, and should give that service by means of buses, regarding the bus as a transportation medium independent of the rail service. It is also felt that the railroads should use the bus for the giving of sight-seeing or special tours in combination with rail excursions.

It is a known fact that in many cases there is much duplication of train service between large centers of population. It might be well for the railroads to recognize that there is a very definite amount of travel between such points, and that by a pooling of their resources a very much more frequent service could be given with a smaller number of trains, thus making marked savings in operating expenses, and at the same time, carrying the same number of persons. It is recognized that the competitive spirit animating the railroads makes such a plan difficult of adoption, but it would seem that, based on experience, it should not be difficult to determine definitely what proportions of the business have been normally handled by the various roads serving the same points. Through a pooling of revenues and expenses, based on such normal divisions of business, each road could undoubtedly secure a greater net revenue than by continuing the highly expensive competitive services now in vogue. It is felt that all that is needed is a spirit of fair play and an earnest desire actually to solve the problem.

Meeting Truck Competition

With respect to the motor truck, the recommendation concerning legislation made in the paragraphs above applies with equal force. It might be said, however, that it will be difficult to meet the competition of the trucks until some equitable basis of rates for the motor trucks is secured. The only other method, and that appears doubtful, is that through an intensive educational campaign the public might be brought to realize the economic fallacy of supporting unregulated common carrier and contract truckers.

However, if we assume the same equality in opportunity between the railroad and the truck, then it is felt that some of the following methods will have to be established in order to enable railways to compete with trucks or to regain business which has been lost:

First.—Store-door collection and delivery service will have to be established.

Second.—For distances up to 50 or 60 miles, motor trucks will have to be operated by the railroads—giving store-door delivery in competition with independent trucking. It is not believed that any rail or combination of rail and truck handling can successfully compete with the truck in such territory.

Third.—It will be necessary that freight stations, generally, be kept open later than they are now for the receipt and delivery of freight.

Fourth.—Sufficient forces of delivery and receiving clerks should be employed to prevent any delays to trucks at freight stations for those merchants who handle their own freight to and from stations. This is very important if no store-door delivery and collection system is established.

Fifth.—For the smaller communities along divisions, it would seem desirable that local freight trains make their distribution of freight at night, so that the freight will be available for the receiver at 7:00 a.m.

Sixth.—It may be desirable that store-door delivery and collection be made by a railroad trucking agency and the freight taken to consolidating stations for make-up into solid cars for destination points. Such freight as can be so handled might well be placed in containers to obviate handling at transfer sheds, though the use of containers is limited largely to that by some consolidating agency.

Trailers and Containers

Discussions have recently appeared in various magazines and newspapers with respect to the use of convertible-wheel trailers which have the capacity for running either on the highway or over the rail. These vehicles have been mentioned as a means of solving the store-door delivery problem. Unfortunately, however, it is generally known and proved by railroad statistics that about 98 per cent of l. c. l. shipments are of such nature that they will not make a minimum trailer or container load of the type described from one shipper to a receiver, and it is therefore necessary that all of this freight go through a consolidating station. That being the case, of course, vehicles of this nature will be limited in their application.

The committee feels that all of these container and trailer schemes have some place of application and might well continue to be experimented with, with a view to their widest possible use. It would seem, however, that the general policy of the railroads should be that the railroads as transportation agencies should use any and all means of conducting transportation which may be desired by the general public and for which there is economic justification. The railroads, better than any other agency, can determine through trial and study the economic sphere of various methods, and adopt those methods in their proper places.

The committee then inserted detailed data relating to motor vehicle registration and to the relative taxation burdens of motor and railway common carriers showing not only the wide variation in practice in different states but also the gross inadequacy of motor carrier taxation as compared with that to which the railways are subjected. The treatment of this phase of the subject was similar to presentations that have already

appeared in the *Railway Age* and is not, therefore, represented here.

Air Transport Service

With respect to air transport, we are quoting some figures showing the services in 1930 as compared with 1929.

	1930	1929
Number of planes in transport service	685	.....
Number of domestic routes	102	118
Number of foreign routes	20	
Number of operators	47	48
Total miles airways operating	49,529	36,330
Miles mail airways operating	41,501	26,597
Mileage schedule daily (average) mail	77,526	51,230
Mileage schedule daily (average) non-mail	41,586	36,454
Number of passengers carried	385,910	173,405
Passenger miles	94,545,774	.....
Mail carried (pounds)	8,005,201	7,772,014
Express carried (pounds)	286,798	197,538
Miles flown	28,833,967	25,141,499

This statement shows a reasonable increase in the use of airplanes, and it is the opinion of the committee that, with improvement in design which will result in greater safety and lower cost of operation, the airplane will become a greater factor in the transportation of persons and of valuable express matter.

It is recommended that the railroads give continued attention to a study of the use of airplanes, in order that they may avail themselves of the opportunity to give such service as and when occasion seems to demand.

Discussion

This report was received with much interest and was warmly approved. In discussing it, J. M. Walsh (I.C.) described how he had gone from town to town on his division talking with the merchants and other prominent citizens on the value of the railway payroll to their communities and urging more co-operation on their part in routing their traffic over rail rather than bus and truck lines, meeting with only partial success. He urged the necessity for more intensive study by the railways to meet these new conditions.

The Division Superintendent's Duties

The duties of a division superintendent, the organization of his subordinate staff on the division to obtain the highest degree of supervision, and the superintendent's relations with the public in civic affairs and municipal government were discussed in the report presented by a committee of which W. H. Haley, assistant general superintendent of transportation, M. P., St. Louis, Mo., was chairman. This report, which was especially well received, follows in abstract:

The position of superintendent is one of the most important in a railroad organization, not only to the company, but to the employees, and to the communities served. The superintendent is truly the representative of the management in his territory. On many well-operated railroads the superintendent is the general manager of his division in all that the name implies.

The importance of the position of railroad superintendent makes it incumbent upon the management to use care in filling this place. Certainly only men of the highest type should be used, and they should be morally, physically and mentally capable. As the superintendent is really the company in his territory, personality is an important factor. He should be able to meet the public well, be tactful, diplomatic, gentlemanly under all conditions, and able to hold his own in any gathering and under all circumstances. The standing of a railroad in its territory is determined largely by the integrity and reputation of its division official personnel, and this is particularly applicable to the superintendent.

Must Know Performance

The first duty of a superintendent is to know that his division is functioning properly at all times. He must have economy and efficiency in operation if he is to be successful, and his check and contact must be daily, rather than weekly or monthly. On a heavy traffic division it is impossible to maintain suitable contact unless reliable and up-to-date statistics are available. He must at all times be in touch with his train load, with figures showing suitable comparisons with corresponding previous periods. The same applies to overtime, separated as between local and through freight; unit cost, which is generally the cost of handling 1,000 gross tons one mile; fuel performance; the cost of handling coal at coal chutes; the transportation cost of handling locomotives; the cost of handling cars in important yards; the cost of handling merchandise at principal stations; the number of cars in yards compared with normal; the cars on line compared with normal; the average miles per car per day; a station-to-station check of cars on hand, with an explanation of individual cars excessively delayed; a general understanding of the program and performance in maintenance of way and maintenance of equipment.

Often divisions are not so organized as to enable a superintendent to keep in daily touch with these important details of operation, and as a result frequently unsatisfactory, expensive and perhaps wasteful conditions are allowed to exist for a considerable period of time before they are detected and corrected.

The superintendent who fails to list among his major activities a real interest in the traffic department and its problems, does not fully appreciate the responsibilities and duties of his position. He must be in close touch with the r[illegible]e freight loaded locally on his division, that destin[illegible]o points on his division, and through traffic moving over his division, and guard jealously the interests of his company in routings, taking suitable action to overcome short hauls, and be alert at all times to improve his service by adjustment of schedules to fit changing traffic conditions, to the end that his company may enjoy not only what is sometimes termed "it's share of the business," but also attract new business. The responsibility of maintaining interest and enthusiasm on the part of employees generally in the solicitation of traffic, both freight and passenger, and promoting the best interests of their company devolves very largely upon the superintendent.

It has been said that a division cannot be handled successfully unless the superintendent possesses the knack and ability to handle men successfully, and this is undoubtedly true; to handle men properly, any supervisor must be a man of good character, considerate, thoughtful and thorough to the extent of being able to analyze all phases of a problem and approach it from various viewpoints, and above all things be broad and fair, and big enough to divorce all personal feelings and prejudices from company business, but fearless in rendering and exercising decisions fairly and judiciously reached. Discipline must be maintained, and can be maintained without the semblance of unpleasantness as between the superintendent and his men, if the subject is handled in a fair and businesslike manner.

Employee Meetings

Experience in recent years has demonstrated the importance of divisional employee meetings. These meetings provide an excellent medium of contact between the superintendent and his staff, and the rank and file. Well planned and properly conducted meetings are conceded to be of great benefit to the operation of a division, but meetings held simply to comply with instructions and "go through the motions" are of little or no benefit. Men should be encouraged to air their views on details of operation in employee meetings, and the superintendent and

other division officers should let it be known that they are big enough to accept constructive criticism in the proper spirit. Meetings should be made instructive and entertaining if interest and attendance are to be maintained, but without good attendance and interest the meetings are of little real value. Employees should be encouraged to prepare papers on suitable subjects, such as fuel conservation, safety and rule observance.

Division officers subordinate to the superintendent should be men of proper experience, competent and reliable; the responsibilities and duties of their positions should be placed squarely on their shoulders, and they should be held strictly accountable for results. The tendency that sometimes develops in superintendents to take over the duties and responsibilities of subordinates should be avoided. The superintendent should confer freely with his staff and at all times be closely in touch with them in their work.

It is of the utmost importance that close and friendly contact be maintained by the superintendent with municipal authorities. Personal acquaintance with mayors, councilmen and other city officials is certain to be of immense value in dealing with municipalities. Agents should be urged immediately to notify the superintendent personally of anything of importance that develops at their stations, affecting the interest of the company. Acquaintance and frequent contact with officers of chambers of commerce and other civic bodies, as well as business men generally, are helpful and important and if the superintendent is so constituted that he can make a creditable address, speaking engagements tend to promote good feeling between the railroads and the communities they serve, and to keep the public informed with regard to the position of the company on subjects of mutual interest. The responsibility of maintaining desirable and proper public relations rests very largely with the superintendent.

Must Know All Division Activities

Frequent motor car trips over the entire division, with stops at all stations and section gangs, are of value in enabling a superintendent to keep in close touch with his men and their activities and with conditions generally on the line, and are of value in maintaining proper morale among the men. Station employees and others appreciate contact with the head of the division, and these motor car trips offer an excellent opportunity for the superintendent to gain information concerning industrial and agricultural development and other local conditions.

On a railroad operated under the unit system, the superintendent should not lose sight of the fact that he is the responsible head of his division, and he should avoid the mistake that is so often made of allowing the department through which he advanced to his present position to overshadow other important branches of the service. His interest in transportation, maintenance of way, maintenance of equipment, stores and traffic should be as nearly equal as is consistent, and in making inspection trips he should be accompanied as far as practicable by his division engineer, master mechanic and other division officers, and delve with them into suitable details of operation. A superintendent who fully realizes that his position places him in a fertile field for accomplishment, and who, regardless of how efficiently his division may be operated or how efficiently he thinks it is being operated, is continually striving for still better results, and surrounds his activities with thought and good organization, is certain to be a real asset to his company, and at the same time will enjoy the satisfaction of knowing in his own mind that he is making a reasonably good job of a worth-while undertaking.

Union Pacific In Strong Position

IN the first six months of the current year the Union Pacific Railroad proper suffered a decline of but 2.6 per cent in freight revenues, as compared with the same period of 1930. Its total operating revenues were 6.1 per cent less than a year ago; its operating expenses, on the other hand, were reduced by 6.4 per cent, so that the operating ratio for the first half of 1931 actually showed a fractional improvement over the same period of 1930. Net railway operating income was 12.9 per cent less than in the first half of 1930. Revenue and expense comparisons between the first half of 1931 and the same period of 1930 for the four roads making up the Union Pacific System are given in Table I.

It will be seen from this table that the other three roads of the system were not quite so fortunate as the parent company in maintaining their revenues. All showed comparable zeal, however, in reducing their operating expenses. The Oregon Short Line had a revenue loss of 11.2 per cent which it matched with a reduction of 10.2 per cent in operating expenses. On the Los Angeles & Salt Lake the revenue decline was 14.6 per cent and that in expenses, 11.7 per cent. The Oregon-Washington met a loss of 15.4 per cent in revenues by a reduction of 11.3 per cent in expenses. In a recent survey of leading railroads to determine the elegibility of their bonds on the basis of present earnings as legal savings bank investments, the Wall Street Journal showed that the Union Pacific had in the twelve months ended June 30 earned its fixed charges 3.1 times, as compared with the legal requirement of 1.5 times. Of 30 roads surveyed, this margin ranked fourth from the highest. Earnings per share of common stock in the same twelve months averaged $13.93, which may be compared with the regular annual dividend rate of $10. The twelve months earnings for the period ended June 30, however, were lower than those of any calendar year since 1922.

Selected statistics of operating performance for the four important roads constituting the system for the first five months of 1931 as compared with the same period of 1930 are given in Table II. It will be noted that the Union Pacific, with a decline of 2.9 per cent in net ton-miles showed a saving of 3.7 per cent in train-miles, 4.4 per cent in locomotive-miles and 9.3 per cent in train-hours. The average train load and train speed were increased so that gross ton-miles per train-hour rose 14 per cent and net ton-miles per train-hour, 7.1 per cent. A gratifying increase in fuel efficiency was also manifested.

The Oregon-Washington met a reduction of 15.5 per cent in net ton-miles with a reduction of 14.8 per cent in train-miles, 16.2 per cent in locomotive-miles and 18.9 per cent in train-hours. Train speed was advanced, bringing a material increase in both gross and net ton-miles per train hour. Coal consumption per 1000 gross ton-miles was reduced by more than 10 per cent. The Oregon Short Line, with net ton-miles reduced 10.8 per cent, was able to bring down its train-mileage almost in the same proportion and to effect an even greater reduction in locomotive-miles and train-hours. Its average train load and train speed were increased, bringing improvement in gross and net ton-miles per train-hour. Coal consumption per thousand gross ton-miles declined 7.7 per cent.

The Los Angeles & Salt Lake had a loss of 11.6 per

Table I—Union Pacific System—Revenues and Expenses—First Six Months of 1931 Compared with Same Period in 1930

	Union Pacific		Oregon Short Line		O. W. R. R. & N.		L. A. & S. L.	
	1931	Inc. or Dec. % of 1930	1931	Inc. or Dec. % of 1930	1931	Inc. or Dec. % of 1930	1931	Inc. or Dec. % of 1930
Freight Revenues	34,239,078	— 2.6	11,397,694	—10.0	7,821,872	—16.0	7,480,312	—12.7
Total Operating Revenues	43,158,589	— 6.1	13,606,463	—11.2	9,792,085	—15.4	9,851,875	—14.6
Maint. of Way Expenses	5,029,553	+ 0.6	2,193,534	—16.1	2,004,372	—10.0	1,758,200	— 2.6
Maint. of Equip. Expenses	10,084,876	— 7.6	2,367,241	—12.1	1,546,755	—16.3	1,638,958	—17.4
Transportation Expenses	12,982,810	— 8.4	4,326,764	— 9.6	4,035,855	—12.2	3,200,812	—13.4
Total Operating Expenses	31,987,445	— 6.4	10,280,350	—10.2	8,872,537	—11.3	7,872,471	—11.7
Operating Ratio	74.1	— 0.4	75.6	+ 1.2	90.6	+ 4.9	79.9	+ 3.4
Net from Railway Operations	11,171,144	— 5.1	3,326,113	—14.3	919.548	—41.4	1,979,404	—24.5
Net Ry. Operating Income	6,032,781	—12.9	1,040,793	—34.2	— 801,769	—681.88	355,343	—61.3

cent in net ton-miles, which it countered with a reduction of 10.8 per cent in train-miles, 13.3 per cent in locomotive-miles and 17.4 per cent in train-hours. Train speed was augmented by 7.8 per cent, bringing almost similar improvements in gross and net ton-miles per train-hour. Taken altogether, the figures plainly disclose a high degree of managerial alertness and skill in matching traffic losses by savings in operating expenses.

Revenues, expenses and traffic and operating statistics for the system for 1930 and the eight years preceding are given in Table III, which discloses in detail the system's strength and suggests some of the reasons for it. Revenues showed a steady increase, with but minor fluctuations, up to the end of 1929, whereas operating expenses were maintained on a fairly stable level. Earnings per share rose until in 1929 they passed $20 per share, but still dividend disbursements were not increased. Millions of earnings have been reinvested in the property and in securities. At the end of 1930 the corporate surplus totaled $342,410,767, or $106.39 for each share of common stock outstanding. When this equity is added to the par value of the stock, the $10 dividend appears in its true light as a yield of less than 5 per cent upon the stockholder's bona fide equity in the property. Plainly the company's financial policy is one of the greatest conservatism and the highest integrity.

Table II—Comparison of Selected Freight Operating Statistics—Five Months

	Union Pacific				Oregon Short Line				O. W. R. R. & N.				L. A. & S. L.			
			Per cent of change				Per cent of change				Per cent of change				Per cent of change	
	1931	1930	Inc.	Dec.	1931	1930	Inc.	Dec.	1931	1930	Inc.	Dec.	1931	1930	Inc.	Dec.
Mileage operated	3,765	3,765			2,532	2,539		0.3	2,218	2,245		1.2	1,235	1,220	1.2	
Gross ton-miles (thousands)	9,285,949	8,985,678	3.3		2,291,564	2,406,278		4.8	1,242,642	1,449,006		14.2	1,418,586	1.600,710		11.4
Net ton-miles (thousands)	3,370,699	3,470,603		2.9	916,709	1,027,939		10.8	532,566	629,859		15.5	529,918	599,199		11.6
Freight train-miles (thousands)	4,090	4,246		3.7	1,241	1,366		9.2	785	921		14.8	782	877		10.8
Freight locomotive-miles (thousands)	4,343	4,541		4.4	1,362	1,514		10.0	874	1,043		16.2	973	1,122		13.3
Freight car-miles (thousands)	247,142	236,357	4.6		57,763	59,427		2.8	30,689	36,074		14.9	36,973	42,222		12.4
Freight train-hours	211,346	233,053		9.3	81,410	92,939		12.4	53,627	66,083		18.9	51,499	62,322		17.4
Car-miles per day	49.0	50.2		2.3	31.4	30.8	2.0		19.8	21.7		8.8	39.7	40.8		2.7
Net tons per loaded car	20.9	21.0		0.5	24.6	25.7		4.3	24.9	24.8	0.4		21.5	22.2		3.1
Per cent loaded to total car-miles	65.3	69.9		6.6	64.5	67.3		4.2	69.8	70.3		0.7	66.7	64.0	4.2	
Net ton-miles per car day	668	737		9.4	499	532		6.2	343	380		9.7	570	580		1.7
Freight cars per train	61.4	56.6	8.5		47.4	44.4	6.8		40.1	40.1	...	...	48.5	49.4		1.8
Gross tons per train	2,271	2,116	7.3		1,846	1,762	4.8		1,583	1,573	0.6		1,813	1,824		0.6
Net tons per train	824	817	0.9		739	753		1.9	678	684		0.9	677	683		0.9
Train speed, miles per train-hr.	19.4	18.2	6.6		15.2	14.7	3.5		14.6	13.9	5.1		15.2	14.1	7.8	
Gross ton-miles per train-hour	43,937	38,556	14.0		28,148	25,891	8.7		23,172	21,927	5.7		27,546	25,685	7.2	
Net ton-miles per train-hour	15,949	14,892	7.1		11,260	11,060	1.8		9,931	9,531	4.2		10,290	9,615	7.0	
Lb. coal per 1,000 gross ton-miles	108	112		3.5	108	117		7.7	154	172		10.4	135	142		4.9
Loco. miles per loco. day	62.6	65.6		4.5	53.8	53.3	0.9		44.4	49.4		10.1	57.0	63.1		9.6
Per cent freight locos. unserviceable	9.9	11.9		16.8	4.9	7.0		30.0	10.5	15.0		30.0	9.5	5.2	82.7	
Per cent freight cars unserviceable	10.2	7.9	29.2		4.6	4.0	15.		5.5	5.0	10.0		2.7	2.2	23.0	

Table III—Union Pacific, Operating Results, Selected Items

Years 1922 to 1930

	1922	1923	1924	1925	1926	1927	1928	1929	1930
Average mileage operated	9,406	9,483	9,510	9,548	9,647	9,676	9,813	9,869	9,869
Total operating revenues	$192,877,122	$211,318,465	$199,035,118	$198,039,901	$205,416,264	$203,891,622	$215,169,245	$217,356,593	$189,672,612
Total operating expenses	143,846,229	152,249,080	141,611,098	138,842,480	140,769,540	146,334,442	146,256,488	147,026,561	131,154,850
Net operating revenues	49,030,892	59,069,385	57,424,020	59,197,421	64,646,723	63,557,180	68,912,757	70,330,031	58,517,762
Railway tax accruals	13,251,551	13,573,067	14,457,715	13,462,886	15,725,933	15,985,844	15,978,221	17,089,568	15,041,887
Railway operating income	35,766,067	45,474,535	42,936,623	45,719,298	48,906,839	47,554,261	52,924,888	53,226,510	43,468,012
Hire of equipment	Dr.1,560,815	Dr.4,938,152	Dr.4,274,781	Dr.4,809,334	Dr.6,028,220	6,954,515	7,965,912	6,974,464	7,593,045
Net railway operating income	33,496,318	39,660,246	37,913,161	40,038,645	42,100,143	39,483,390	43,818,995	45,325,568	35,297,722
Dividends on stock owned	7,888,049	9,473,676	8,122,395	8,725,895	8,893,880	10,276,593	11,369,984	11,597,524	12,579,741
Interest on bonds owned	6,156,427	6,008,541	6,433,990	6,103,127	5,909,971	6,195,669	6,430,397	6,496,949	6,042,382
Total other income	15,749,563	17,513,567	16,226,202	16,539,698	17,129,664	18,435,629	20,346,558	21,598,473	19,837,753
Gross income	49,245,880	57,173,812	54,139,363	56,578,343	59,229,807	57,919,019	64,165,553	66,924,041	55,135,475
Interest on funded debt	16,430,877	16,879,477	17,855,927	17,884,893	17,794,134	17,744,850	17,573,934	17,035,129	15,260,713
Total deductions	16,906,157	17,251,606	18,386,159	18,347,283	18,245,057	18,253,784	18,058,681	17,667,998	16,399,469
Net income	32,339,723	39,922,206	35,753,205	38,231,060	40,984,749	39,665,235	46,106,872	49,256,043	38,736,005
Preferred dividends (4%)	3,981,740	3,981,740	3,981,740	3,981,740	3,981,740	3,981,740	3,981,740	3,981,724	3,981,724
Common dividends—rate	10	10	10	10	10	10	10	10	10
Common dividends—amount	$22,229,160	$22,229,160	$22,229,160	$22,229,160	$22,229,160	$22,229,160	$22,229,160	$22,229,160	$22,229,160
Earnings per share on common	$12.75	$16.16	$14.29	$15.40	$16.64	$16.05	$18.95	$20.36	$15.63
Total revenue tons	27,171,043	30,820,137	31,503,788	32,770,901	34,534,148	34,785,587	35,717,820	36,250,018	31,844,462
Revenue ton-miles (thousands)	10,533,713	11,916,698	11,786,736	12,444,146	13,211,550	13,157,043	14,301,827	14,430,924	12,858,923
Rev. passenger-miles (thousands)	1,056,202	1,142,849	1,057,149	1,050,052	983,164	931,033	889,651	894,453	738,179
Revenue per ton per mile (cents)	1.315	1.285	1.233	1.188	1.178	1.181	1.168	1.172	1.164
Average haul	387.68	386.65	374.14	379.73	382.56	378.23	400.41	398.09	403.80
Operating ratio	74.58	72.05	71.15	70.11	68.53	68.83	67.97	67.64	69.15

Shippers Oppose Rate Increase

Representatives of eastern patrons heard in rate hearing session at Washington

WASHINGTON, D. C.

TESTIMONY on behalf of eastern shippers in opposition to the 15 per cent general advance in freight rates proposed by the railroads was begun on August 10 before Commissioner B. H. Meyer of the Interstate Commerce Commission and W. D. B. Ainey, chairman of the Pennsylvania Public Service Commission. Commissioner J. B. Eastman also attended some of the sessions, which are expected to continue for about two weeks in Washington. While the shippers' representatives generally conceded the need of the carriers for greater revenues they decline to admit that the emergency is as great as has been represented and generally took the position that an increase in revenues would not result from higher rates.

Legal List for Savings Banks

Before the opposition testimony was begun, however, Philip A. Benson, treasurer of the Dime Savings Bank, of Brooklyn, N. Y., and of the Emergency Committee on Railroad Investments of Life Insurance Companies and Mutual Savings Banks, submitted a list of the railroad bonds represented by the committee, making a total of $3,444,801,505 for 55 insurance companies and 187 savings banks. He also gave some additional information regarding the working of the New York savings bank laws, saying that his bank has already sold certain of its railroad bonds that are no longer legal investments, including those of the Lehigh Valley and the Reading, and that under present conditions he would make no substantial investment in railroad securities. He said that after a bond has been removed from the legal list the superintendent of savings banks notifies banks to dispose of their holdings within a reasonable time, but that he had not known of a peremptory demand for an immediate disposition of such bonds. When counsel for shippers brought out that his bank had held its railroad bonds through the last depression he said that there has never been a precedent for the present situation when $5,700,000,000 of bonds are liable to be removed from the legal list.

Commissioner Meyer, saying he was assuming that the country will still need its railroads, asked if a savings bank depositor or insurance policy holder would be seriously prejudiced by a low market value for railroad bonds and an insufficient margin of earnings provided the interest is paid. Mr. Benson replied that marketability is a most important element for a savings bank because it must be able to get cash when it is demanded. When Commissioner Meyer asked if there is any substantial basis for apprehension as to loss of interest on railroad bonds, Mr. Benson said he could not say that there is and that he did not think "many railroads are going into receivership right away," but that the future of the railroad bond market as an investment for savings banks is at stake.

An intimation that a pooling plan may be suggested so that the principal benefits of any rate increase may be given to the roads needing it the most was given by Luther M. Walter, of counsel for the National Industrial Traffic League, who asked Mr. Benson if the emergency as to which the banks and insurance companies are primarily concerned would not be satisfied if the earnings of the roads earning less than one and a half times fixed charges were increased to that amount. Mr. Benson replied in the affirmative.

R. C. Fulbright asked the witness about press reports that the committee was proposing to urge the New York legislature to amend the law so as to suspend the restriction for a year. Mr. Benson said he knew of no such plan and that he questioned whether such a step would be justified, because if prosperity returns it would not be necessary and if railroad earnings are not restored it would be of no use. Charles E. Hughes, Jr., of counsel for the committee, then announced that its members had been greatly disturbed by press reports which had stated without foundation that it had planned to ask for a suspension of the requirements.

C. J. Fagg, representing the Newark, N. J., Chamber of Commerce, said that organization favors a level of railroad rates that will permit of a fair return and that it is not opposed to a 15 per cent advance. J. M. Davison, representing the Commercial Traffic Managers of Philadelphia, said that a rate increase seems to be the only way by which the railroads can [illegible] ation and that if the commission finds that an emergency exists and that increased revenues can be obtained from higher rates they will accept it. Probably, he said, the only way to get quick action would be to increase rates horizontally by percentage supplements to existing tariffs and make reductions afterward but the differentials as between north Atlantic ports should be preserved.

National Grange Objects to Increase

A lengthy statement on behalf of the National Grange declaring that it would be "perfectly preposterous to impose upon the farmer the additional burden of a 15 per cent increase in freight rates" was read into the record by Fred Brenckman, Washington representative, who said that the railroads are suffering from a loss of traffic, rather than from rates that are too low and that higher rates would merely drive more traffic away. L. J. Taber, master of the National Grange, also made a general statement, admitting that the railroads need more money but declaring that they should be compelled to reduce their costs and that "a prostrate agriculture just can't stand" a rate increase. Asked if he thought wages should be reduced, he said: "The farmer hopes he may never be compelled to advocate a reduction of wages but he serves notice emphatically that he is not to be crushed to maintain a high standard of wages."

Walter P. Hedden, representing the New York Port Authority, took no position as to an increase in rates but urged that if any increase is allowed the order provide that existing port differentials shall be maintained by applying the percentage to the basic New York-Chicago rate and fixing the rates to the other ports in relation to that. He said that he had been authorized to make the same statement for the New York Produce Exchange and the Chamber of Commerce of the State of

New York. Fred Junger, representing the Texas Gulf Sulphur Company, opposed an increase in rates on its product as tending to drive the traffic to trucks. E. T. Foxenbergh, for the Associated Industries of the State of New York, presented a protest against any increase of rates which shall be superimposed upon the scale of rates ordered by the commission in the eastern class rate investigation and urged a detailed inquiry into the financial structure and financial needs of the railroads.

Favors Reducing Rates

A reduction of railroad rates, for the purpose of stimulating an increased volume of traffic on the principle of "quick sales and small profits" was recommended by J. W. Roberts, consulting accountant, who was introduced by Wilbur La Roe, Jr., as a witness for his clients, including the Port of New York Authority, and the Associated Industries of New York. Mr. Roberts introduced a set of statistical exhibits, mostly ending with 1930, which he said showed that while the railroads need additional revenues, that need does not constitute an emergency, and that they cannot be called in a serious plight when they are collectively meeting their fixed charges and paying large dividends. He said that conditions should be judged by the results over a period of years, rather than by those of a "few months" and that the financial conditions of the roads has improved under the present level of rates.

One of his exhibits showed a profit and loss balance of $3,833,596,013 at the end of 1930, which he called "free surplus" as distinguished from the $1,343,972,448 of appropriated surplus, making a total of $5,177,568,461, 43.78 per cent greater than that of 1923. While all of the "free surplus" may not have been kept in a form convenient for distribution, he said, it is sufficient to pay dividends for 7.3 years, and he said that in 1930 the railroads paid in dividends more than 5 per cent on all their stock, making the best dividend year in their history for Class I roads.

After stating that investment in road and equipment at the end of 1930 represented 121 per cent of that in 1923 while the productive traffic volume had increased only 105 per cent, Mr. Roberts said the railroads are in the position of a merchant who has overstocked his shelves in anticipation of a business that did not materialize and that they must find a way of meeting competition. To increase rates at present, he said, would be inconsistent with economic trends and commodity prices and as an indication that the railroad traffic departments realize this he submitted a list of scores of applications filed with the commission by the railroads for authority to make reductions in rates on short notice since the first of the year.

Under cross-examination by H. W. Bikle, of the Pennsylvania, Mr. Roberts admitted that some of the increased investment in recent years represented increased costs of labor and materials rather than expansion of facilities and that a different picture would be presented by a comparison in 1929, before the decrease in traffic incident to the depression became pronounced. For that year the investment had increased to 116 per cent of that of 1923 while the traffic volume was 114.76 per cent. He also said he recognized that much of the railroad surplus was invested where it is not now available for distribution, which led Commissioner Eastman to ask whether the railroads, if they keep their surplus other than in cash or readily marketable securities, are not in much the same position so far as meeting the situation of lean years is concerned, as if they had not been allowed high enough rates in previous years to earn a surplus. Mr. Roberts assented. He also admitted that, compared with 1931, the year 1930, on which many of his exhibits were based, was a relatively prosperous year and that the net earnings have been not much more than half of what they were last year, while the current assets were lower for 1930 than for any year shown in his exhibits.

Export Coal Rates

Arthur Hale, chairman of the Coal Exporters' Association, outlined the efforts of that association to build up an export coal trade in spite of the handicap of freight rates, saying that while the Shipping Board had co-operated in bringing about a reduction in ocean rates the railroads had not been persuaded to establish reduced export coal rates for fear of disturbing the domestic rates. He said that all of the competing countries in northern Europe have reduced their rail rates in favor of export coal and that if our railroads would make the rates on export coal that they are making on grain the exports overseas could be increased by many million tons. He introduced a number of coal exporters who testified that their margin of profit on coal was less than the amount of a 15 per cent increase in freight rates and that if the rates are advanced they would have to close up their foreign offices and relinquish the field to foreign competitors, because the price of coal has been reduced to a point where it cannot be further reduced.

Virginia Can't Stand Increase

A large part of the session on August 11 was devoted to testimony of witnesses introduced by the Virginia Corporation Commission, representatives of agricultural and commercial interests who said they could not stand an increase in rates. T. D. Georghegan presented a series of statistical exhibits which he said showed that the results of railroad operations in 1930 were more favorable than in 1921 and that the railroads in the Pocahontas region are in the "recapture class." These lines standing alone, he said, have no reason to ask for an increase in freight rates at the expense of shippers who are suffering the effects of the depression and he declared that they received a higher rate increase than they needed as a result of the 1920 rate case. When counsel for the Chesapeake & Ohio objected to the introduction of exhibits pertaining to individual lines on the ground that the commission had announced that such evidence would not be received, Commissioner Meyer reserved a ruling, saying the commission may decide they should not be admitted. Mr. Geoghegan also presented an analysis of the exhibit showing the holdings of railroad bonds by insurance companies and savings banks, saying that they included only a small proportion of bonds of southern roads. Generally speaking, he said, the whole state of Virginia is opposed to the proposed increase in rates.

A. W. Drinkard, director of the Virginia Farm Experiment Bureau, read a long statement to show the depressed condition of agriculture in that state, saying that instead of contributing to the relief of the railroads the farmers are themselves in need of relief. Other testimony in opposition to the increase was given by F. G. Louthan, secretary of the Virginia Manufacturers' Association and Benjamin S. Dowdell, representing a number of paper manufacturers. These are operating at a loss, he said, and prices are so low and competition so keen that an increase in rates could not be added to the price.

On the following day Commissioner Meyer announced that the exhibits relating to particular roads in the Pocahontas region would not be received.

The testimony on August 12 was largely by interests who said that if rates are advanced they would have to

resort more to the use of trucks and waterways and that the railroads would lose more than they would gain by such a step. D. A. Dashiell, traffic manager of the F. S. Royster Guano Company, estimated that a 15 per cent increase in rates would amount to $5,700,000 a year for the fertilizer industry, adding 50 cents a ton to the cost of the inbound raw materials and 45 cents a ton to the rate on the product. He submitted a list of about a hundred manufacturers or shippers of fertilizer who are opposed to a rate increase and said that freight rates are now as high as the industry can stand and that prices are in such a state that the increase could not be added. He pointed out that since 1915 there has been a steady increase in the average car loading of fertilizer. Similar testimony was given by Frank G. Moore, of the Davison Chemical Company, and A. D. Whittemore, of the American Cyanamid Company, who said that an increase in rates would force them to make greater use of trucks and waterways. J. B. Jones, secretary of the Southside Virginia Just Rate Association, said that an increase in rates would cripple industry and reduce the tonnage of the railroads. L. D. Snow, traffic manager of Lever Brothers Company, manufacturers of soap and glycerine, said that the company's policy has been to foster rail transportation but that a 15 per cent rate increase would amount to several hundred thousand dollars a year and would force it to divert its freight to trucks and water lines wherever possible. He also expressed the opinion that this would tend to increase the average haul of the trucks.

H. W. Lockwood, representing the American Veneer Packing Association, manufacturers of containers for fruits and vegetables, said that the railroads have already lost a large part of their traffic and he cited case after case in which manufacturers are now receiving the bulk of their inbound logs by truck instead of by rail. He said also that the trucks that carry fruits and vegetables to market are also developing an extensive business of carrying the containers for return loads and expressed the opinion that an increase in freight rates would actually reduce the revenue received by the railroads from this traffic. Instead, he said, the rates should be reduced to a figure that would move this traffic.

W. R. Moore, traffic manager of the Eastern Confectioners' Traffic Bureau, appearing for the National Confectionary Manufacturers' Association, testified that a 15 per cent increase in freight rates would amount to $725,000 a year for the industry on the finished product, in addition to the added cost of raw materials, and that it would cause a large diversion of the traffic to waterways and trucks. Other testimony in opposition to a rate advance was given by W. F. Everding, of the Brown Company, Berlin, N. H.; C. J. McSwain, of the Albemarle Paper Manufacturing Company; E. R. Clark, of the Metal & Thermit Corporation, and H. F. Masman, of the National Association of Waste Material Dealers. Shortly after noon on Wednesday the hearing came to a temporary standstill for want of witnesses, because those who had been scheduled for the following day had left the hearing room. Mr. Bikle stated that if the program had allowed for cross-examination it might be speeded up because the railroads expect to have little cross-examination of the shipper witnesses unless general statistical testimony is presented. Witnesses had been scheduled up to August 21.

At the opening of the hearing the commission put into the record an exhibit compiled by the Bureau of Statistics comparing costs of railroad fuel from 1920 to 1930, showing a steady reduction, and another compiled by the Bureau of Valuation giving similar comparisons as to prices of many other railroad supplies.

A law committee representing the regulatory commissions of South Dakota, Iowa, Minnesota, Kansas, Nebraska, and North Dakota, filed a motion asking the commission to enter an order dismissing the petition of the carriers on the ground that there is no authority in law empowering the commission to increase freight rates by reason of financial emergencies alone; that the carriers have wholly failed to show by any competent evidence that the rates which would result from a 15 per cent increase will be just and reasonable for present or future application; that they have failed and neglected to show by any competent evidence that the traffic will be able to bear the rates which will be produced by the 15 per cent increase sought; that they have failed to show that traffic will freely move if the increase is granted, and that no evidence has been submitted to show that the proposed increase would in fact produce additional revenues.

If this motion be denied, they ask the commission, as an alternative, to deny the petition in so far as it requests the commission to further increase rates which have been recently prescribed by the commission, under the authority of the Hoch-Smith Resolution.

On August 12 Commissioner Meyer announced that the motion would be held for consideration in connection with other issues in the case at the time of the general argument after the hearings are concluded. This was after counsel for the railroads had filed an answer denying most of the allegations of the motion and asserting that the application of the carriers "is justified in law, apart from an emergency situation." They also pointed out that the evidence submitted on their behalf has been in all material respects parallel to, and in certain respects more comprehensive and complete than, the evidence submitted in the 1920 rate case, "a proceeding in which this commission deemed the carriers' showing adequate to justify increased rates, a decision of the commission which has been referred to with apparent approval by the Supreme Court of the United States." Referring to the Hoch-Smith proceedings they said that such conclusions as were reached "were reached apparently with a view to establishing what the commission believes to be a proper relationship of certain rates to the present rate structure and do not indicate a general rate level of that structure conformable with law." They also said that they have presented "relevant, and indeed, conclusive evidence that the general level of freight rates is below the level contemplated by law, a fact admitted by witnesses introduced on behalf of the interests opposing increases in rates."

Proposed Increase "Wicked"

An unusual form of testimony for a rate case was introduced by Noah W. Cooper, of Nashville, Tenn., representing the Methodist Church South, who was given 15 minutes to explain that the financial difficulties of the railroads are due to the fact that they have "fallen into the alien, Satanic and calamitous habit" of running their trains on the Sabbath and to urge the commission to call a conference to consider an agreement to institute strict Sabbath observance in the railroad business. He also characterized the proposed 15 per cent increase as "wicked." He brought along a Bible as an exhibit but not enough copies to comply with the commission's rules. When he pointed out that the commission does not hold hearings on Sunday Commissioner Meyer said that did not mean that the commissioners do not have to work on Sunday, but Mr. Cooper said its "public example" was good anyway.

Operating Statistics of Large Steam Railways—Selected Items for the Month of June, 1931,

Region, road and year	Average miles of road operated	Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross. Excluding locomotives and tenders	Ton-miles (thousands): Net. Revenue and non-revenue	Average number of locomotives on line: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:												
Boston & Albany.....1931	402	134,792	141,340	11,430	3,695	66.8	189,779	63,607	80	49	37.8	22
1930	407	151,854	162,283	16,845	4,284	65.1	227,118	79,174	104	23	18.3	49
Boston & Maine.....1931	2,066	297,119	339,458	30,231	9,818	68.8	502,673	181,807	209	89	29.9	32
1930	2,066	334,073	380,318	50,316	11,184	69.6	575,275	219,035	239	53	18.3	64
N. Y., New H. & Hart...1931	2,074	429,178	501,637	26,125	13,471	63.5	720,146	254,182	254	93	26.8	27
1930	2,104	431,934	497,326	29,427	14,263	63.2	784,772	294,479	270	69	20.4	36
Great Lakes Region:												
Delaware & Hudson.....1931	876	240,729	314,168	34,650	7,713	60.9	476,349	212,793	240	31	11.4	122
1930	875	286,119	371,719	36,781	9,097	61.8	560,183	253,981	238	31	11.6	106
Del., Lack. & Western....1931	998	381,697	419,542	46,490	12,345	66.1	705,650	280,477	220	53	19.5	39
1930	998	426,956	470,338	53,423	14,430	66.1	825,926	335,419	232	56	19.5	42
Erie (inc. Chi. & Erie)....1931	2,316	704,315	734,589	64,365	30,654	59.4	1,873,186	654,416	384	100	20.7	118
1930	2,316	787,451	843,784	63,173	34,442	60.8	2,108,223	806,523	410	88	17.8	90
Grand Trunk Western.....1931	1,022	228,615	230,713	1,985	5,918	59.9	352,915	122,247	115	34	22.9	38
1930	1,020	264,884	269,082	3,624	7,353	62.4	424,628	152,257	118	29	19.8	24
Lehigh Valley 1931	1,343	412,993	435,781	38,555	12,578	63.3	766,616	316,468	217	137	38.7	39
1930	1,343	465,188	501,938	51,250	14,694	64.5	898,362	390,599	259	81	23.9	25
Michigan Central.....1931	1,869	373,269	373,937	9,041	11,941	60.2	690,937	229,877	155	59	27.4	59
1930	1,865	429,718	430,819	14,575	14,350	59.2	843,807	288,647	166	49	22.7	44
New York Central.....1931	6,477	1,566,567	1,677,897	96,392	57,767	60.6	3,562,160	1,435,183	864	540	38.5	266
1930	6,468	1,739,904	1,904,125	131,154	67,000	61.2	4,137,375	1,738,445	1,029	334	24.5	371
New York, Chi. & St. L...1931	1,660	463,713	481,814	3,187	14,987	59.4	883,383	296,786	177	68	27.7	60
1930	1,665	543,238	570,146	6,386	17,646	60.0	1,037,605	365,822	204	58	22.2	53
Pere Marquette.....1931	2,201	303,910	308,433	3,537	7,278	59.9	454,698	176,084	146	31	17.5	36
1930	2,177	363,949	369,730	4,464	8,908	60.5	558,456	226,994	169	22	11.7	39
Pitts. & Lake Erie.....1931	235	80,811	83,474	1,400	2,734	57.9	225,960	125,191	61	17	22.2	34
1930	232	113,828	115,790	1,766	4,355	64.1	348,585	203,717	55	15	20.7	24
Wabash 1931	2,497	650,259	682,779	11,703	19,513	61.2	1,132,480	353,926	268	139	34.1	54
1930	2,497	663,966	704,311	10,347	21,107	62.6	1,219,985	424,105	297	77	20.7	59
Central Eastern Region:												
Baltimore & Ohio.....1931	5,536	1,309,116	1,502,812	166,998	40,432	59.8	2,689,279	1,154,256	905	281	23.7	289
1930	5,541	1,503,551	1,736,846	223,643	49,984	61.4	3,370,284	1,542,826	1,001	182	15.4	275
Big Four Lines.....1931	2,721	602,480	626,722	17,886	18,366	59.6	1,168,027	501,309	266	162	37.9	54
1930	2,712	704,839	733,064	16,084	21,481	61.8	1,359,375	610,207	299	159	34.8	41
Central of New Jersey.....1931	692	183,876	198,875	30,149	5,241	56.1	355,546	155,404	140	44	24.1	46
1930	692	244,187	265,886	41,237	6,859	57.3	462,135	207,252	161	32	16.5	25
Chicago & Eastern Ill.....1931	939	166,612	166,788	2,217	4,015	61.8	239,385	94,207	92	67	42.1	44
1930	946	205,399	205,522	2,219	5,468	62.7	328,502	135,548	99	53	34.8	39
Elgin, Joliet & Eastern...1931	447	91,252	93,611	1,993	2,178	59.1	168,423	82,995	76	15	16.6	21
1930	453	118,419	125,592	4,669	3,285	62.5	250,644	129,941	72	16	18.1	3
Long Island.....1931	400	41,453	43,956	11,216	485	52.8	35,579	14,561	43	5	9.5	1
1930	400	42,951	47,194	10,979	491	53.1	34,577	13,608	36	9	20.6	1
Pennsylvania System.....1931	10,637	3,177,903	3,544,905	355,335	107,115	61.1	7,077,983	3,018,181	2,268	286	11.2	839
1930	10,687	3,505,436	4,009,212	388,691	126,762	61.6	8,481,414	3,747,864	2,439	291	10.7	677
Reading 1931	1,451	469,520	508,357	45,319	12,415	57.6	893,644	408,418	315	77	19.8	77
1930	1,454	566,306	613,777	53,265	15,444	58.0	1,125,719	533,138	314	59	15.9	53
Pocahontas Region:												
Chesapeake & Ohio.....1931	3,116	947,850	995,380	34,658	37,227	55.1	3,146,2[illegible]	683,131	672	57	7.8	330
1930	3,085	1,083,008	1,150,550	49,817	40,663	55.5	3,345,008	1,780,439	534	107	16.7	101
Norfolk & Western.....1931	2,232	672,696	725,416	30,799	24,153	59.0	1,974,248	1,021,917	449	39	7.9	152
1930	2,230	768,141	854,712	41,778	29,121	58.6	2,371,325	1,234,426	453	50	9.9	123
Southern Region:												
Atlantic Coast Line.....1931	5,163	710,793	719,416	10,031	15,789	62.8	854,012	303,663	412	76	15.6	84
1930	5,155	627,152	629,926	8,828	15,785	60.4	867,833	298,449	379	70	15.6	96
Central of Georgia.....1931	1,900	235,107	236,287	5,549	5,298	66.0	291,370	108,406	118	31	20.6	—
1930	1,900	262,203	265,539	4,114	5,980	65.7	328,793	123,875	125	23	15.3	1
Ill. Cent. (inc. Y. & M. V.)1931	6,670	1,583,301	1,601,396	26,884	37,582	60.4	2,445,536	900,762	715	188	20.8	38
1930	6,695	1,665,616	1,680,743	29,254	44,310	60.8	2,877,434	1,120,249	721	126	14.9	65
Louisville & Nashville.....1931	5,263	1,179,156	1,241,692	33,782	24,673	57.5	1,693,855	750,612	519	180	25.8	119
1930	5,244	1,382,180	1,463,346	42,126	29,598	58.1	2,044,832	937,430	568	132	18.8	93
Seaboard Air Line.....1931	4,466	529,954	548,051	6,442	12,394	63.1	700,379	256,181	270	24	8.2	36
1930	4,479	509,081	525,370	5,583	12,496	63.4	700,142	262,845	273	32	10.5	16
Southern 1931	6,675	1,189,164	1,203,292	21,209	27,903	64.3	1,536,919	576,819	797	174	17.9	219
1930	6,676	1,266,631	1,291,211	23,555	30,470	63.4	1,720,140	656,438	807	152	15.8	202
Northwestern Region:												
Chi. & North Western....1931	8,459	1,094,924	1,141,622	27,646	27,272	62.7	1,613,735	587,082	681	116	14.6	143
1930	8,459	1,195,780	1,248,662	21,384	31,491	62.3	1,875,835	708,570	758	88	10.5	138
Chi. Gt. Western.....1931	1,459	224,157	224,334	17,020	6,925	59.5	427,215	160,085	104	12	10.5	12
1930	1,459	254,894	272,304	20,946	7,929	62.8	455,854	172,166	104	10	8.8	12
Chi., Milw., St. P. & Pac..1931	11,302	1,347,452	1,436,852	73,070	35,887	60.3	2,250,342	886,664	781	137	14.9	305
1930	11,313	1,440,426	1,530,295	79,286	41,465	62.3	2,517,356	1,019,997	801	138	14.7	251
Chi., St. P., Minn. & Om..1931	1,714	232,653	249,929	10,126	4,675	65.7	265,039	107,265	151	23	13.2	60
1930	1,724	267,834	289,023	12,154	5,783	66.8	324,737	133,772	151	26	14.8	36
Great Northern 1931	8,342	597,973	603,247	18,299	19,640	67.4	1,230,246	576,833	484	144	22.9	141
1930	8,338	749,366	762,097	32,733	27,128	64.9	1,732,493	859,565	447	160	26.3	53
Minn., St. P. & S. St. M...1931	4,356	361,862	366,667	2,699	8,224	66.3	454,470	188,827	158	67	30.0	33
1930	4,351	399,029	409,368	2,912	11,069	67.2	612,681	268,382	171	49	22.5	22
Northern Pacific.....1931	6,427	630,648	666,554	40,905	17,833	66.4	1,048,759	407,947	393	122	23.8	74
1930	6,473	709,427	754,392	46,915	21,425	68.8	1,234,639	514,603	408	118	22.4	48
Oreg.-Wash. R. R. & Nav..1931	2,218	154,330	159,874	10,661	4,044	68.8	230,511	95,592	120	16	12.0	54
1930	2,246	174,363	181,917	11,101	4,796	69.8	270,646	115,534	116	21	15.6	39
Central Western Region:												
Atch., Top. & S. Fe (incl. P. & S. F.).....1931	11,548	1,447,120	1,566,647	70,881	42,116	64.7	2,551,145	921,563	739	194	20.8	228
1930	11,200	1,532,045	1,658,680	81,219	48,681	64.9	2,929,830	1,108,040	793	147	15.6	236
Chicago & Alton.....1931	1,000	220,848	230,395	1,679	5,049	56.9	326,429	123,423	109	35	24.0	28
1930	1,000	253,947	265,201	1,871	6,153	56.8	399,958	140,723	132	15	10.5	33
Chi., Burl. & Quincy.....1931	9,257	1,103,898	1,131,353	28,684	30,611	59.3	1,822,576	768,458	591	118	16.7	88
1930	9,275	1,208,068	1,261,459	52,636	36,252	61.8	2,133,257	936,964	635	151	19.2	45
Chi. Rock I. & Pacific....1931	7,593	1,160,326	1,204,443	6,219	28,479	56.9	1,834,216	652,049	496	134	21.3	122
1930	7,593	1,299,551	1,357,984	10,197	32,808	58.5	2,064,484	778,423	544	126	18.8	105
Denver & R. G. Wn.....1931	2,536	179,133	192,794	18,601	5,087	66.3	294,174	120,502	226	20	7.9	89
1930	2,562	212,020	242,302	33,819	6,047	66.7	356,111	158,049	211	37	14.7	55
Los Angeles & Salt Lake..1931	1,241	154,724	169,383	16,830	4,547	68.6	257,672	95,042	101	13	11.8	38
1930	1,220	152,364	169,938	22,380	4,609	63.7	279,950	105,826	112	5	3.9	30
Oregon Short Line.....1931	2,532	243,342	249,291	12,474	6,009	66.9	341,132	134,192	157	9	5.7	61
1930	2,539	241,431	248,450	14,233	7,063	66.2	416,820	171,201	163	12	7.1	72
So. Pacific—Pacific Lines..1931	8,954	1,392,986	1,492,342	148,142	44,219	58.3	2,811,423	820,252	657	267	28.9	173
1930	8,975	1,364,176	1,476,887	175,520	44,606	62.1	2,766,910	939,189	698	209	23.0	154
Union Pacific 1931	3,765	765,697	780,790	32,181	29,725	66.7	1,696,073	630,223	399	43	9.8	183
1930	3,765	780,493	798,270	33,240	31,214	66.2	1,771,362	658,821	375	63	14.3	135
Southwestern Region:												
Gulf, Colo. & S. Fe.....1931	1,965	216,890	233,459	5,493	6,170	64.8	393,810	171,247	107	15	12.1	31
1930	1,931	217,265	235,893	7,784	7,672	68.9	483,610	228,740	110	17	13.7	26
Mo.-Kans.-Texas Lines....1931	3,176	359,619	365,115	5,359	10,116	60.1	603,636	217,831	166	56	25.0	76
1930	3,176	376,436	384,999	7,841	12,212	60.5	739,352	291,551	169	71	29.6	74
Missouri Pacific 1931	7,417	1,161,993	1,193,182	29,678	32,845	60.2	2,054,140	755,914	534	99	15.7	208
1930	7,423	1,279,939	1,328,150	32,249	37,278	61.3	2,330,108	936,645	536	85	13.7	170
St. Louis-San Francisco....1931	5,175	698,699	706,970	10,625	15,862	57.2	1,008,243	366,997	383	82	17.7	77
1930	5,169	715,553	728,459	9,493	18,332	60.1	1,115,671	427,858	359	85	19.2	52
St. Louis Southwestern Lines 1931	1,902	311,512	332,744	5,093	9,213	53.9	591,533	156,089	112	25	18.3	19
1930	1,805	363,492	362,878	10,062	9,526	57.7	594,947	194,324	110	21	15.8	9
Texas & New Orleans....1931	4,686	625,371	629,118	1,006	14,802	56.5	957,420	307,954	226	111	32.9	33
1930	4,691	647,011	649,026	2,505	15,221	58.8	958,120	345,104	274	55	16.6	63
Texas & Pacific.....1931	1,946	407,006	407,006	3,656	11,456	57.0	736,633	225,815	178	65	26.6	31
1930	1,951	445,006	445,006	4,597	12,267	57.0	823,906	282,168	191	42	17.9	36

Compiled by Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Compared with June, 1930, for Roads with Annual Operating Revenues Above $25,000,000

Region, road and year	Average number of freight cars on line: Home	Foreign	Total	Per cent unserviceable	Gross ton-miles per train-hour, excluding locomotives and tenders	Gross ton-miles per train-mile, excluding locomotives and tenders	Net ton-miles per train-mile	Net ton-miles per loaded car-mile	Net ton-miles per car-day	Car-miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Locomotive-miles per locomotive-day
New England Region:													
Boston & Albany.....1931	3,491	3,034	6,525	11.9	21,290	1,408	472	17.2	325	28.3	5,277	153	39.5
1930	3,708	3,623	7,331	6.5	20,823	1,496	521	18.5	360	29.9	6,483	144	47.0
Boston & Maine.....1931	10,937	7,839	18,776	10.2	21,559	1,692	612	18.5	323	25.3	2,934	111	41.3
1930	11,512	9,735	21,247	5.8	20,914	1,722	656	19.6	344	25.2	3,534	104	49.2
N. Y., New H. & Hart..1931	18,992	11,718	30,710	15.5	23,908	1,678	592	18.9	276	23.0	4,085	102	50.7
1930	17,899	13,511	31,410	13.5	24,040	1,817	682	20.6	313	23.9	4,664	101	51.8
Great Lakes Region:													
Delaware & Hudson.....1931	11,068	3,712	14,780	3.6	25,690	1,979	884	27.6	480	28.6	8,100	119	42.9
1930	10,463	4,892	15,295	4.2	25,614	1,958	888	27.9	554	32.1	9,673	117	50.7
Del., Lack. & Western..1931	18,897	4,520	23,417	6.5	25,555	1,849	735	22.7	399	26.6	9,367	126	56.9
1930	18,775	5,687	24,462	5.1	25,477	1,934	786	23.2	457	29.7	11,201	124	60.6
Erie (inc. Chi. & Erie)..1931	33,653	12,357	46,010	4.9	40,145	2,660	929	21.3	474	37.4	9,420	96	55.0
1930	35,650	15,722	51,372	4.1	38,000	2,677	1,024	23.4	523	36.8	11,608	101	60.7
Grand Trunk Western...1931	5,215	9,057	14,272	9.1	24,895	1,544	535	20.7	286	23.1	3,989	92	51.8
1930	4,307	10,373	14,680	6.4	23,738	1,603	575	20.7	346	26.8	4,977	98	61.7
Lehigh Valley 1931	22,077	5,313	27,390	9.2	30,708	1,856	766	25.2	385	24.2	7,856	128	44.6
1930	20,229	7,523	27,752	8.1	28,507	1,931	840	26.6	469	27.4	9,696	135	54.3
Michigan Central.....1931	24,927	15,191	40,118	6.5	34,058	1,851	616	19.3	191	16.5	4,100	100	59.7
1930	24,127	14,048	38,175	5.0	33,978	1,964	672	20.1	252	21.2	5,158	100	69.1
New York Central.....1931	80,132	65,676	145,808	9.9	33,442	2,274	916	24.8	328	21.8	7,386	93	42.1
1930	75,730	66,310	142,040	5.0	33,126	2,378	999	25.9	408	25.7	8,960	95	49.8
New York, Chi. & St. L..1931	16,020	7,606	23,626	9.3	30,368	1,905	640	19.8	419	35.6	5,959	95	66.2
1930	15,601	8,799	24,400	8.2	29,665	1,910	673	20.7	500	40.2	7,325	93	73.3
Pere Marquette.....1931	12,519	4,469	16,988	3.3	22,909	1,496	579	24.2	346	23.8	2,667	88	58.8
1930	9,317	6,365	15,682	3.7	22,407	1,534	624	25.5	482	31.3	3,476	93	65.2
Pitts. & Lake Erie.....1931	20,068	4,299	24,367	8.8	36,264	2,796	1,549	45.8	171	6.5	17,756	93	36.3
1930	15,926	6,251	22,177	5.4	40,571	3,062	1,796	46.8	306	10.2	29,268	87	56.1
Wabash 1931	20,874	9,007	29,881	7.6	33,719	1,742	544	18.1	395	35.5	4,725	102	56.8
1930	18,525	10,400	28,925	3.1	31,292	1,837	639	20.1	489	38.9	5,662	106	63.7
Central Eastern Region:													
Baltimore & Ohio.....1931	80,798	17,918	98,716	5.7	26,465	2,054	882	28.5	390	22.8	6,950	133	46.9
1930	79,230	24,260	103,490	4.9	26,438	2,242	1,026	30.9	497	26.2	9,282	129	55.2
Big Four Lines.....1931	24,733	21,794	46,527	6.5	32,112	1,939	832	27.3	359	22.1	6,142	103	50.2
1930	25,634	21,190	46,824	4.2	30,218	1,929	866	28.4	434	24.7	7,501	107	54.5
Central of New Jersey...1931	17,205	7,613	24,818	12.2	25,293	1,934	845	29.7	209	12.6	7,483	137	41.5
1930	17,741	9,121	26,862	5.4	24,454	1,893	849	30.2	257	14.9	9,979	137	53.1
Chicago & Eastern Ill....1931	6,028	2,326	8,354	9.5	24,902	1,437	565	23.5	376	25.9	3,344	117	35.4
1930	13,262	3,345	16,607	44.6	27,701	1,599	660	24.8	272	17.5	4,775	111	45.6
Elgin, Joliet & Eastern..1931	9,274	3,865	13,139	5.9	15,391	1,846	910	38.1	211	9.4	6,188	116	35.0
1930	9,771	6,251	16,022	4.8	15,895	2,117	1,097	39.6	270	10.9	9,565	104	49.3
Long Island 1931	787	5,111	5,898	.6	6,751	858	351	30.0	83	5.2	1,213	307	38.7
1930	770	4,511	5,281	1.5	6,219	805	317	27.7	86	5.8	1,133	325	43.0
Pennsylvania System.....1931	241,444	57,191	298,635	5.8	31,401	2,227	950	28.2	337	19.6	9,458	114	50.9
1930	232,505	72,515	305,020	3.8	31,084	2,420	1,069	29.6	410	22.5	11,690	113	53.7
Reading 1931	37,167	9,607	46,774	4.3	23,063	1,903	870	32.9	291	15.4	9,382	130	47.1
1930	32,940	11,076	44,016	5.0	23,089	1,988	941	34.5	404	20.2	12,225	132	59.6
Pocahontas Region:													
Chesapeake & Ohio.....1931	49,569	9,153	58,722	2.4	45,615	3,319	1,776	45.2	955	38.4	18,004	71	47.1
1930	43,574	10,862	54,436	2.4	41,250	3,089	1,644	43.8	1,090	44.9	19,240	78	62.4
Norfolk & Western.....1931	38,028	5,623	43,651	1.1	43,038	2,935	1,519	42.3	780	31.2	15,262	106	51.7
1930	34,733	7,584	42,317	1.2	43,712	3,087	1,607	42.4	972	39.1	18,452	108	59.4
Southern Region:													
Atlantic Coast Line.....1931	24,832	6,270	31,102	6.7	20,709	1,201	427	19.2	325	27.0	1,961	109	49.8
1930	23,020	6,020	29,040	5.7	21,003	1,384	476	18.9	343	30.0	1,930	100	47.5
Central of Georgia.....1931	7,444	3,305	10,749	13.2	20,209	1,239	461	20.5	336	24.9	1,902	124	54.1
1930	6,443	3,810	10,253	8.0	18,936	1,254	472	20.7	403	29.6	2,174	125	60.7
Ill. Cent. (inc. Y. & M. V.)1931	52,568	14,943	67,511	10.3	25,147	1,545	569	24.0	445	30.7	4,501	123	60.1
1930	48,146	17,238	65,384	4.8	25,518	1,728	673	25.3	571	37.1	5,578	119	67.3
Louisville & Nashville....1931	50,937	8,726	59,663	13.2	21,663	1,436	637	30.4	419	24.0	4,754	134	60.8
1930	48,825	10,630	59,455	9.3	21,960	1,479	678	31.7	526	28.5	5,959	130	71.6
Seaboard Air Line.....1931	15,931	4,914	20,845	8.5	19,776	1,322	483	20.7	410	31.4	1,912	122	62.8
1930	14,629	5,570	20,199	3.4	19,233	1,375	516	21.0	434	32.5	1,956	121	58.0
Southern 1931	55,917	10,879	66,796	13.5	20,477	1,292	485	20.7	288	21.6	2,880	143	42.0
1930	53,918	13,026	66,944	12.4	20,670	1,358	518	21.5	327	23.9	3,278	143	45.7
Northwestern Region:													
Chi. & North Western...1931	50,151	19,482	69,633	8.3	20,736	1,474	536	21.5	281	20.8	2,314	119	48.9
1930	50,125	22,469	72,594	7.8	20,757	1,569	593	22.5	325	23.2	2,792	118	50.0
Chi. Gt. Western.....1931	4,311	3,417	7,728	7.7	30,047	1,906	714	23.1	690	50.2	3,657	114	69.1
1930	**4,213**	**3,864**	**8,077**	**4.9**	**26,345**	1,788	675	21.7	711	52.1	3,933	122	85.7
Chi., Milw., St. P. & Pac.1931	60,468	13,964	74,432	1.9	24,291	1,670	658	24.7	397	26.6	2,615	113	54.8
1930	58,530	16,679	75,209	3.0	23,711	1,748	708	24.6	452	29.5	3,005	116	57.2
Chi., St. P., Minn. & Om..1931	2,942	8,657	11,599	7.2	15,572	1,139	461	22.9	308	20.4	2,086	114	49.8
1930	2,401	9,209	11,610	6.5	16,237	1,212	499	23.1	384	24.8	2,587	107	56.8
Great Northern 1931	43,755	6,364	50,119	5.7	28,831	2,057	965	29.4	384	19.4	2,305	109	33.0
1930	42,629	7,717	50,346	6.0	30,954	2,312	1,147	31.7	569	27.7	3,436	106	43.7
Minn., St. P. & S. St. M. 1931	20,756	3,213	23,969	3.6	18,523	1,256	522	23.0	264	17.3	1,445	96	54.7
1930	20,082	4,215	24,297	3.0	19,899	1,535	673	24.2	375	23.0	2,056	90	62.5
Northern Pacific.....1931	41,920	4,629	46,549	11.0	25,529	1,663	647	22.9	292	19.2	2,116	134	45.8
1930	41,601	5,365	46,966	9.4	25,244	1,740	725	24.0	365	22.1	2,650	139	50.8
Ore.-Wash. R.R. & Nav..1931	8,810	2,085	10,895	3.3	22,432	1,494	619	23.6	292	18.0	1,437	145	41.9
1930	8,284	2,740	11,024	5.2	22,690	1,552	663	24.1	349	20.8	1,715	150	46.9
Central Western Region:													
Atch., Top. & S. Fe (incl. 1931	71,501	12,615	84,116	8.1	29,621	1,763	637	21.9	365	25.8	2,660	100	58.5
P. & S. F.).....1930	70,194	16,275	86,469	7.2	30,261	1,912	723	22.8	427	28.9	3,298	101	61.7
Chicago & Alton.....1931	10,845	2,838	13,683	8.8	27,243	1,478	559	24.4	301	21.6	4,115	116	53.7
1930	10,555	4,203	14,758	5.6	26,384	1,575	554	22.9	318	24.5	4,692	115	60.6
Chi., Burl. & Quincy....1931	44,530	12,590	57,120	7.0	25,069	1,651	696	25.1	448	30.1	2,767	113	54.5
1930	46,124	15,086	61,210	6.1	25,307	1,766	776	25.8	510	31.9	3,367	114	55.8
Chi., Rock I. & Pacific..1931	38,570	13,784	52,354	10.6	24,378	1,581	562	22.9	415	31.8	2,862	121	64.0
1930	35,910	16,783	52,693	6.7	24,509	1,589	599	23.7	492	35.4	3,418	125	68.1
Denver & R. G. Wn.....1931	13,477	2,512	15,989	2.5	22,950	1,642	673	23.7	251	16.0	1,584	154	28.7
1930	12,881	3,189	16,070	3.0	22,076	1,680	745	26.1	328	18.8	2,057	155	37.2
Los Angeles & Salt Lake.1931	4,563	1,067	5,630	2.2	26,115	1,665	614	20.9	563	39.2	2,554	126	54.4
1930	4,578	1,190	5,768	1.9	26,445	1,837	695	23.0	612	41.8	2,891	133	54.8
Oregon Short Line.....1931	7,598	2,449	10,047	5.9	22,972	1,402	551	22.3	445	29.8	1,767	113	52.5
1930	8,510	3,298	11,808	5.6	25,685	1,726	709	24.2	483	30.1	2,248	107	49.9
So. Pacific—Pacific Lines.1931	41,714	23,475	65,189	7.4	30,207	2,018	589	18.5	419	38.8	3,054	109	59.2
1930	40,176	26,320	66,496	5.0	28,360	2,028	688	21.1	471	36.0	3,488	107	60.8
Union Pacific.....1931	**25,487**	**6,462**	**31,949**	**7.1**	43,299	2,215	823	21.2	657	46.4	5,580	99	61.3
1930	23,846	7,126	30,972	6.7	42,858	2,270	844	21.1	709	50.7	5,832	100	63.3
Southwestern Region:													
Gulf, Colo. & S. Fe.....1931	10,286	2,536	12,822	3.3	28,963	1,816	790	27.8	445	24.8	2,905	94	65.1
1930	10,646	3,036	13,682	4.2	33,685	2,226	1,053	29.8	557	27.1	3,948	86	63.8
Mo.-Kans.-Texas Lines...1931	13,881	5,184	19,065	4.4	27,306	1,679	606	21.5	381	29.4	2,286	81	55.7
1930	17,888	5,382	23,270	5.1	30,137	1,964	775	23.9	418	28.9	3,060	85	54.4
Missouri Pacific.....1931	32,922	15,734	48,656	12.7	28,585	1,768	651	23.0	518	37.4	3,397	111	64.4
1930	32,551	17,596	50,147	6.0	26,966	1,820	732	25.1	623	40.4	4,206	113	73.0
St. Louis-San Francisco..1931	26,724	6,730	33,454	3.0	22,670	1,443	525	23.1	366	27.6	2,364	124	51.5
1930	26,433	7,941	34,374	3.0	21,526	1,559	598	23.3	415	29.6	2,759	130	55.5
St. Louis Southwestern 1931	6,110	4,595	10,705	7.8	30,659	1,899	501	16.9	486	53.2	2,736	86	82.5
Lines 1930	6,828	4,929	11,757	5.5	26,058	1,637	535	20.4	551	46.8	3,589	93	95.2
Texas & New Orleans....1931	12,637	14,048	26,685	6.1	24,301	1,531	492	20.8	385	32.7	2,190	87	62.3
1930	12,167	13,900	26,067	4.1	22,063	1,481	533	22.7	441	33.1	2,452	86	66.1
Texas & Pacific.....1931	6,314	6,218	12,532	9.6	28,522	1,810	555	19.7	601	53.5	3,869	81	56.3
1930	6,314	5,071	11,385	5.9	28,324	1,851	634	23.0	826	63.0	4,820	84	64.5

Communications . . .

The Question of Wage Rates

To the Editor:

The question of wages should not be taken up with the purpose of proving they are too high. They are not! Nor as the only means of placing the railroads on the road to prosperity. Lower wages will not do so! The question should be taken up only as a last resort in order to put expenses more in line with revenues. If the depression and the indifferent attitude of government servants prove to be more than our railroads can successfully cope with, then it is my opinion that the employees must do their share and shoulder some of the responsibility in the form of a small reduction in wages.

Such a sacrifice would be made easier if those at the head of our transportation units would see to it that it was applied with some degree of fairness—those on the lower level (below $1,500 per year) to be left alone; those at the top, in the executive and managerial departments, to receive the same proportional treatment as others. In that case I feel that, notwithstanding the sacrifices already made due to restrictions placed in effect by road men limiting their mileage, and the plan of voluntary laying off so as to enable those with less seniority to make a living; the closing of offices due to less traffic and heavier tonnage trains, in many instances beyond the capacity of passing sidings; the annulling of yard jobs from day to day; the stagger system of working maintenance of way departments every other day; the holding up of tonnage in terminals to insure high gross tons per train—at the expense of shippers who assume they are receiving prompt movement; and other arrangements which have lowered the pay of a majority of railroad workers—notwithstanding these facts, I believe the lower cost of living compels us to look the facts in the face and realize that a five or eight dollar cut per month is better than no job at all.

The railroads of America are suffering from a multitude of difficulties: High taxes, loss of business to bus and truck lines, unfair decisions by public representatives in the matter of continuing passenger service at an unreasonable loss, the act of government agencies in taking business away by subsidizing other forms of transportation in the use of inland and coastal waterways, and fooling the people into thinking that rates are lower by this method of moving traffic by obscuring the fact that if taxes are added—which are taken from the public for maintenance—it proves to be a costly form of service. Public officers can too easily obtain the consent of our government to try these experiments at the expense of the taxpayers and thus put our railroads at a disadvantage, reacting on millions of homes in lowered earning power, inability to invest in railroad securities with safety and finally jeopardizing the investment of millions of others through the inability of insurance companies, banks, etc., to protect these investments.

Our government during the years of prosperity was too zealous in lowering the war debt by the too generous application of revenues, instead of looking around and investigating other forms of transportation and applying a just tax to bus and truck lines that would insure the railroads of fair treatment and give them an opportunity to fight for business on a fair basis. Let the restrictions be removed on land and water, allowing all to compete for the best interests of the country. Then the railroads, if they fail under normal business conditions to protect their interests, will deserve their present treatment, now chiefly blamable upon Uncle Sam,—a condition brought about by forces which it is impossible for the railroads to control.

In the matter of the rate increase which is up for discussion by the Interstate Commerce Commission, the commission should take into consideration the spirit of fairness in which the executives paid increased taxes when they had the money to do so. It should consider the welfare of millions of Americans depending on the railroads for their very existence. If the decision is adverse to our conception of a "square deal" then, as a last resort, the employees will do their part, provided it is done fairly and with the understanding that if and when prosperity returns, they will be returned to that standard of living which creates prosperity itself—when the strength of the workingman's purchasing power is not lowered by a general state of unemployment.

"Worker."

Overcome Dirt, Noise, Heat, Slowness to Win Back Passengers

Menasha, Wis.

To the Editor:

I was unfortunate enough to have to do a great deal of railroad travel during the recent period of excessive heat so I had considerable time to reflect upon the plight of the railroads, particularly the disappearance of their passenger traffic. I fretted and fumed at the apparently unnecessary delays and the length of time it required to get anywhere on some roads and I perspired and fought cinders and dirt on all of them. I was driven almost frantic by the terrific noise incident to railroad travel but through it all I think I see some hope on the horizon of the future.

The objections to railroad travel are as follows:

1. Lack of speed
2. Discomfort
   - A. Temperature
   - B. Cinders and dirt
   - C. Noise

In connection with the first subject some of the railroads seem to be waking up. Rather late, it is true, but they seem to see the recovery of a part of their lost business by speeding up. On the other hand some of them are confining their efforts to improve their condition to bemoaning their fate.

One of the roads upon which I live runs south to Milwaukee (93 miles) and Chicago (178 miles). The other morning I took a train out of my station for Chicago which was twenty-five minutes late. It left Milwaukee on time and of course got to Chicago on time or a little ahead. Everyone on the train commented upon the ease with which it was done and said: "Why don't they make it in that time every trip?" True, there was a less leisurely handling of baggage and mail, there was no waiting for time at the various stations and we did not spend the usual fifteen or twenty minutes for no particular reason in Milwaukee.

But the speed factor is being taken care of by some roads. Heavier rail, grade crossing separations and electrification are combining to make possible a service which will regain much of the patronage lost to other modes of travel. In the matter of discomfort, electrification will also contribute much to its elimination. It is quieter, it is cleaner and it is much smoother in operation. The jerking that is a part of steam locomotive operation is noticeably absent.

The recent development in air-conditioned railroad cars, however, seems to provide the solution for the rest of the problems of discomfort. Because the cars are carefully insulated and kept closed the noise factor will be reduced. It has been demonstrated that the temperature can be controlled and, of course, with little opportunity for dirt to get in, the cars must be much cleaner.

Incidentally it seems strange to me that some roads in the recent introduction of their infernal automatic locomotive bells should have deliberately increased the noise factor and helped to further fray the nerves of their passengers. It will be some time, of course, before the improvements now possible will become very general but the fact that there is hope is comforting to one who must spend considerable time on the rails.

George Banta, Jr.

Odds and Ends Department Appears On Next Left Hand Page

Pounds OR Performance?

● *SUPER-POWER LOCOMOTIVES ON THE BOSTON AND MAINE*

THERE was a time when weight and traction was everything in a locomotive. If a train could be started, if it could get over the worst grades, the locomotive did all that was required.

In present-day railroading there is no room for such "slow drags". Locomotive performance, measured in gross ton miles per hour, is the governing factor.

The demand now is for maximum power per pound of metal and per pound of fuel burned.

Super-Power Locomotives justify their purchase on this basis. Their increased earning power is making remarkable economies on many leading railroads.

LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA LOCOMOTIVE WORKS • Incorporated • LIMA • OHIO

Odds and Ends . . .

More Old Switch Keys

DALLAS, TEX.

TO THE EDITOR:

In regard to switch keys, I have four: Texas & Pacific, 52 years old; Missouri-Kansas-Texas, 44 years old; Houston & Texas Central (now Southern Pacific), 33 years old; Chicago, Rock Island & Pacific, 33 years old.

J. WILSON.

Presidential Source Drying Up

Where are we going to get our railroad presidents in the future if this sort of thing continues? The job of call boy is generally recognized as the essential first step toward a railroad presidency. Yet reports from Wenatchee, Wash., indicate that the Great Northern has just eliminated from its pay-roll two of the three call boys employed there. It is the telephone which is relegating the call boy to the limbo, but we doubt if even the cleverest telephone could ever develop into a candidate for the presidency of a railroad.

For Services Rendered

For the past 20 years, Thomas H. Brooks, Pullman porter, has been assigned to accompany the equipment furnished by the Pullman Company for the annual inspection trip of the president and board of managers of the Delaware & Hudson over their railway lines. On the last day of the trip this year, Porter Brooks was called "on the carpet," where President [illegible] E. Loree, on behalf of the board of managers, presented him with a watch in recognition of his services on 20 consecutive railroad trips. The cover of the watch was inscribed as follows:

The Delaware and Hudson Company
to
Thomas H. Brooks
In Appreciation of Services
Upon 20 Annual Inspection Trips
President and Board of Managers

Per Diem Saved Is Per Diem Earned

We have been hearing some remarkable stories of the lengths to which railways are going in order to avoid paying per diem on foreign cars. The St. Louis-San Francisco received seven Rock Island cars loaded with stock at Enid, Okla., delivered them to Beaumont, Kan., where they were unloaded, and returned them to Enid without incurring per diem. These cars were moved 256 miles while in the possession of the Frisco in a little over twelve hours. In another case, 15 Rock Island stock cars were moved from Enid to Lela, Okla., and returned, 120 miles, in 11 hours and 10 minutes.

Service Man Extraordinary

A few days ago, a Pennsylvania express train, bound for New York stopped not long after leaving Philadelphia. The passengers became uneasy, and some of them climbed out to find the engine crew trying to make a minor repair on the engine. The job puzzled them. Then from the crowd stepped a prosperous looking citizen, who said: "Give me a hammer, and I will fix it for you."

Without waiting to don overalls, he went to work, and in a short time the engine was in running condition.

"Who is that man?" asked a passenger.

"That is Sam Vauclain," replied another.

The volunteer engine mender was the chairman of the board of the Baldwin Locomotive Works at Philadelphia. He worked in the shop, learned his trade, came up from the ranks, and is now head of the greatest locomotive-making plant in the world.—From the Wall Street Journal (New York).

A Safety Lesson for the Public

In the Union station at Indianapolis, Ind., at the entrance to the train concourse, is a glass case containing a model of a Cleveland, Cincinnati, Chicago & St. Louis Pacific type locomotive. But unlike other displays of this nature, the exhibit carries a distinct safety message to the traveling public. Mounted on the top of the case is a flashing light highway crossing signal at the base of which is a sign with this inscription:

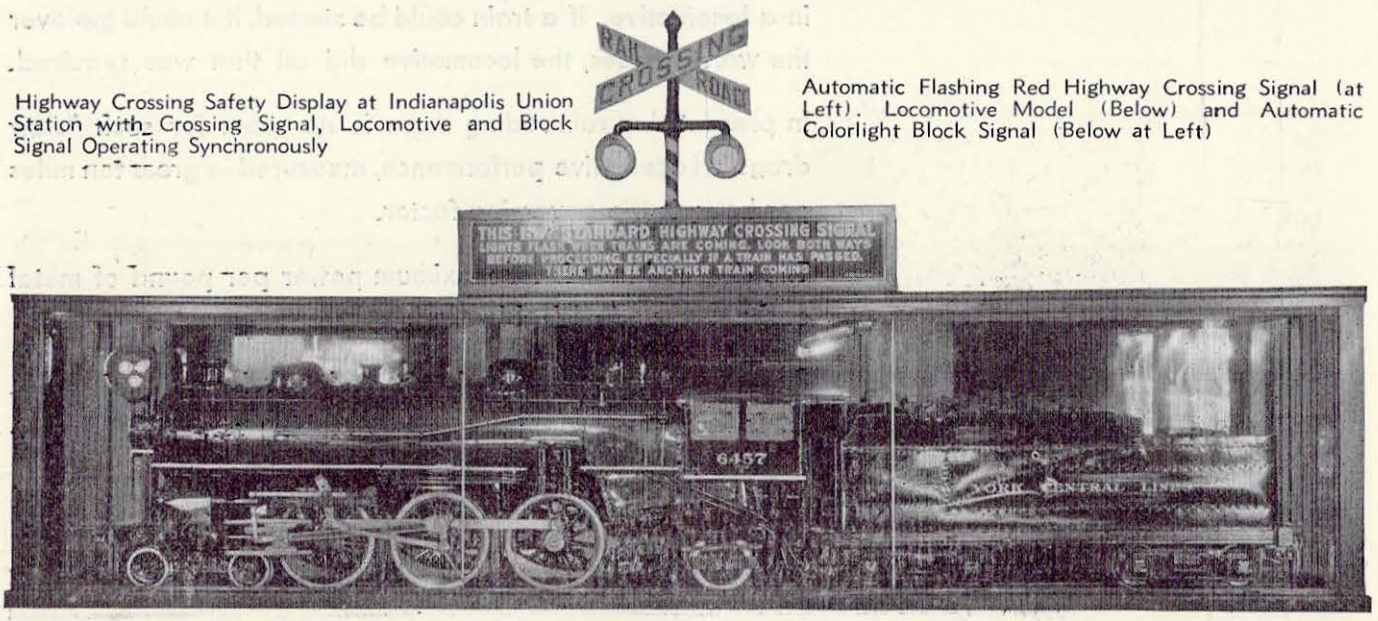
This is a standard Highway Crossing Signal.
Lights flash when trains are coming. Look both ways
before proceeding, especially if a train has passed.
There may be another train coming.

Set up at the front of the locomotive is a three-position color light automatic block signal. The driving wheels of the locomotive model revolve while the block signal gives a green indication and the highway signal flashes its red indication. When the block signal changes to yellow, the driving wheel power is turned off, and immediately following, the block signal changes to the red position and the highway signal stops flashing, indicating that vehicular traffic may proceed over the imaginary crossing.

The locomotive model was constructed by B. G. Chamberlain, Big Four safety agent at Indianapolis. It is 10 ft. long, 17½ in. wide, 23 in. high and weighs 1,370 lb.

Highway Crossing Safety Display at Indianapolis Union Station with Crossing Signal, Locomotive and Block Signal Operating Synchronously

Automatic Flashing Red Highway Crossing Signal (at Left). Locomotive Model (Below) and Automatic Colorlight Block Signal (Below at Left)



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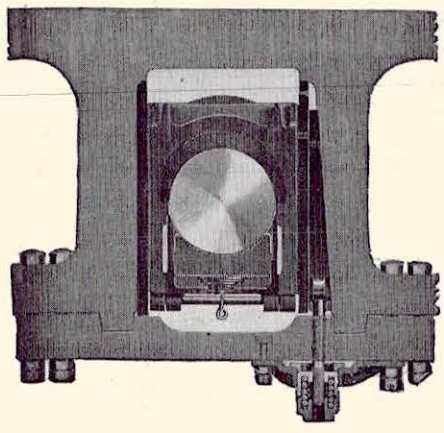
No HAND ADJUSTMENT *can do* THIS JOB . . .



■ THE FRANKLIN AUTOMATIC ADJUSTABLE WEDGE

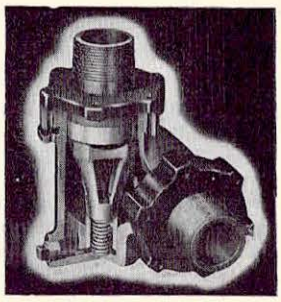
Set-up an ordinary driving box wedge in the round-house as tight as you dare, and even then you must allow a little play to prevent a stuck box. That play soon grows to a clanking pound and shortly the brasses run hot or need attention.

But Franklin Automatic Adjustable Wedges eliminate all slack. They adjust themselves automatically with every revolution of the drivers. Slack has no opportunity to develop and cause trouble.

Franklin Automatic Adjustable Driving Box Wedges keep brasses from pounding their way into the shop. Use them to lower maintenance and keep modern power in service.

THE FRANKLIN SLEEVE JOINT

A reliable conduit, free from limitations in movement, permitting short vertical pipes and greater rail clearance.



FRANKLIN RAILWAY SUPPLY CO., INC.

NEW YORK CHICAGO SAN FRANCISCO ST. LOUIS MONTREAL

NEWS

Freight Traffic for Six Months

The volume of freight traffic handled by the Class I railroads in the first six months of 1931 amounted to 174,328,623,000 net ton-miles, according to reports compiled by the Bureau of Railway Economics. This was a reduction of 37,916,444,000 net ton-miles, or 17.9 per cent, under that of the corresponding period in 1930, and a reduction of 26.9 per cent under that of the same period in 1929. Railroads of the Eastern district for the first half of 1931 reported a reduction of 18.1 per cent in freight traffic compared with the same period in 1930, while the Southern district reported a decrease of 18 per cent. The Western district reported a decrease of 17.5 per cent.

For June, freight traffic amounted to 28,257,921,000 net ton-miles. Compared with June, 1930, this was a reduction of 6,159,528,000 net ton-miles, or 17.9 per cent, and it was a reduction of 12,482,113,000 net ton-miles, or 30.6 per cent, under June 1929. In the Eastern district, the freight traffic in June was a reduction of 18.6 per cent compared with the same month in 1930, while the Southern district reported a decrease of 15.2 per cent. The Western district reported a decrease of 17.9 per cent.

British Railway Stockholders Organize

Stockholders of British railways held an organization meeting at Central Hall, Westminster, London, on July 22. Criticism was voiced of unequal favors granted to highway transport, while some in attendance criticized railway management and merchandising methods. A report of the meeting, as published in the Times (London) follows in part:

"Sir Charles Stuart-Williams, who presided, after referring to the unfair competition of road transport, said that road and rail traffic should be regulated. That meant rationalization of the whole of the traffic in the country. Traffic Commissioners should be appointed to lay down what the road should have and what the railway should keep.

"Mr. Ashley Brown put forward a programme of reform which included the organization of the boards of directors, electrification of suburban railways, simplification and adjustment of passenger fares and freight charges, improved running schedules, economies in operation, improved organization for collection and delivery, and decentralization of control. He submitted that for a long period the railways had been sapped by effete control.

"Dealing with the reduction and simplification of passenger fares, he said that 85 per cent. of the traffic was carried at cheap fares, but these were so hedged about with restrictions that they kept off as much traffic as they attracted. He had often wondered how much the railways spent upon advertising cheap fares and running special trains to undercut the one fare they maintained was the right fare. The economics of the railways, in his opinion, were the economics of a lunatic asylum. His proposal was that all fares should be at the rate of 1d. per mile third class and 50 per cent. more for first class. If the railways ran proper services the towns in Kent and on the south coast would become suburbs of London, but the services now were worse than in 1914."

An organization committee was appointed to carry on the task of developing a "Railway Reform Association."

Texas Trucking Law Voided

The law recently enacted by the Texas legislature, prohibiting motor trucks from hauling more than 10 bales of uncompressed cotton or 20 bales of compressed cotton and requiring that the bales must be transported in enclosed vans, has been held unconstitutional by three judges sitting en banc in the federal court at Houston, Tex. The court granted a temporary injunction to a cotton-buying and hauling company, restraining state and county officers from enforcing the law. In its opinion, the court held that the Texas law violates the equal protection and due process clauses of the constitution.

Irrigation Special

The Northern Pacific, in conjunction with the Montana State College, the Holly Sugar Corporation, the Great Western Sugar Company, machine companies and others, will operate an irrigation train to aid in correcting defects in irrigated land along the railroad. A special exhibit coach and two flat cars, one loaded with commercial land leveling machinery and the other with home made machinery, will be carried. The exhibits, which will be carried direct to the farmers, have been prepared by the Agronomy department of the Montana State College.

Three-day stops will be made at each of 10 points: Sidney, Mont., on August 20; Miles City on August 23; Finch on August 26; Pompey's Pillar on August 29; Brisbin on September 2; Manhattan on September 4; Helena on September 8; Missoula on September 12; Ronan on September 15 and Park City on September 19. The demonstrations are designed to show graphically the use of water and its measurement, the rotation of crops for irrigated land, the adaption, advantageous and disadvantageous, of irrigation systems, and the details for proper leveling work.

P. R. R. Wilmington-Washington Electrification Work to Begin

The Pennsylvania plans the early inauguration of another major step in carrying out its program for electrification between New York and Washington, D. C. Work will begin at once on the construction of a new conduit system to carry signal, telegraph and telephone lines underground between Wilmington, Del. and Washington, D. C., through Baltimore, Md. The cost of the project, including installation of extensive new cable lines, will be approximately $7,000,000 and the work of laying the conduit alone will require approximately 1,000 men at its peak. More than 100 miles of conduit are included in the project. The work will get under way immediately and will be pushed to completion by the first of next year.

Construction of the new conduit line will complete the underground installation of the railroad's entire system of telegraph, telephone and signal wires for a distance of 225 miles from New York to Washington.

Switching Rates Prescribed for Chicago District

Following an investigation and a cost study the Interstate Commerce Commission has prescribed a new basis of switching charges for application in the Chicago district, representing some modifications from the tariffs proposed by the railroads, on an all-commodity basis. The commission finds that the rates proposed of 3 cents per hundred pounds for one-line hauls, 3.5 cents for two-line hauls, and 4 cents for three-or-more-line hauls, carload minimum 60,000 pounds, will not be unreasonable for the future for application on all the commodities switched within the district, except railway equipment on its own wheels. The latter was not included in the cost study and carriers will be expected to establish a reasonable uniform charge on a per-car basis for application to all movements of railway equipment throughout the district. In instances where it is necessary to utilize private cars, the order says, the shippers should be compensated for the use thereof by specific charges on a rental basis and not through a differential in the freight rates.

B. & O. Runs Specials to "Akron" Christening

The Baltimore & Ohio ran special trains from several Ohio points to Akron, O., for the christening ceremonies of the Airship "Akron" at the Goodyear-Zeppelin Air Dock. One train was made up at Newcastle, Pa., and picked up passengers at Youngstown, O., Niles, Warren, New-

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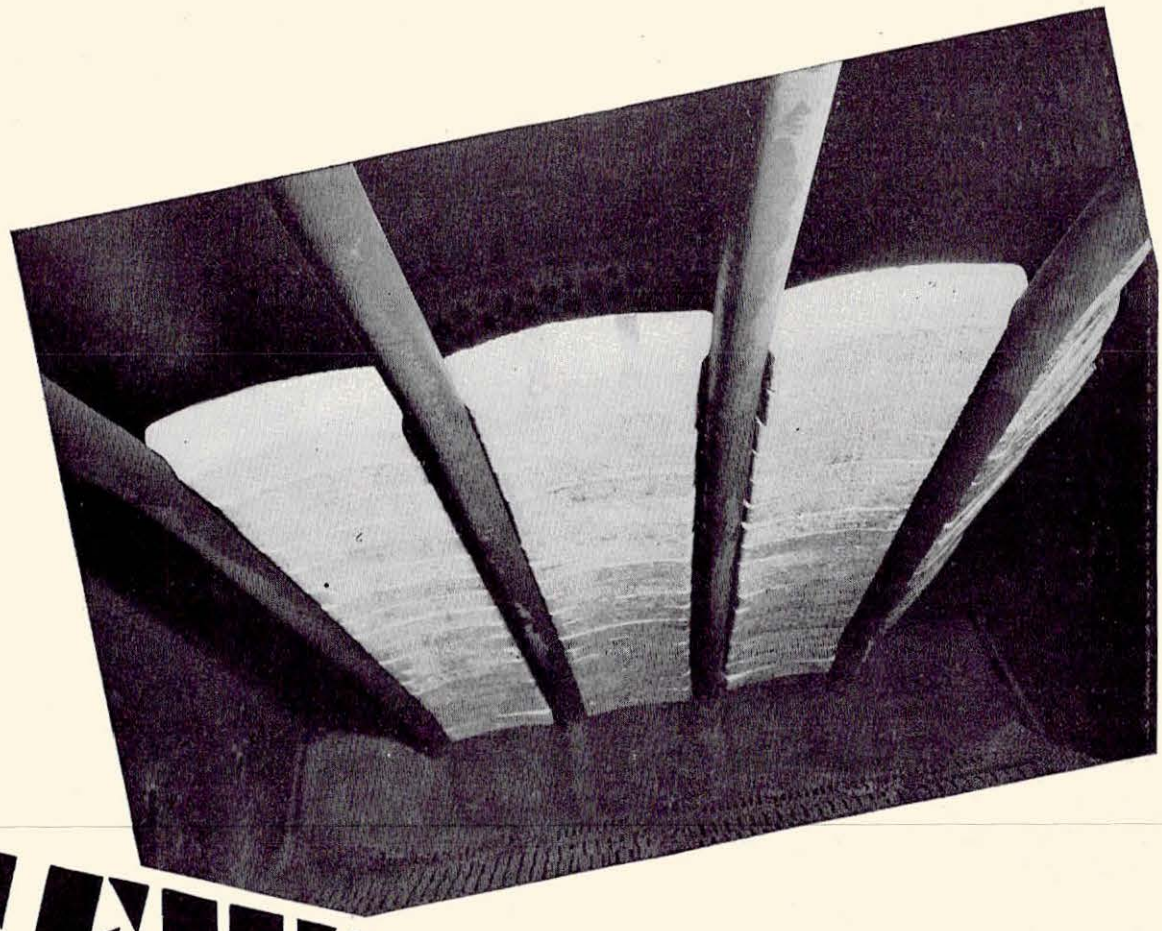
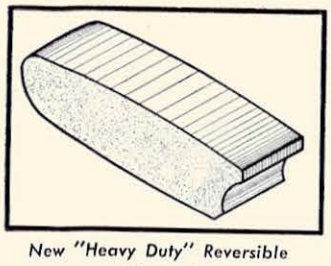
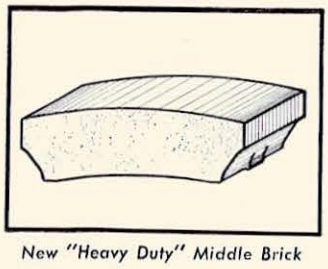


NEW!



New "Heavy Duty" Reversible Side Brick



New "Heavy Duty" Middle Brick

A "Heavy Duty" Arch for Modern Power

POWER recently built has been overworking the locomotive Arch.

Greater power production, bigger fireboxes, longer runs and higher speeds have been taxing its ability.

American Arch Company has been studying this problem and developing a means of meeting the changed conditions.

The new "Heavy Duty" Arch—a distinct departure in Arch brick design—is the result.

Sudden draft changes or excessive vibrations won't tear down this "Heavy Duty" Arch.

You can depend upon it to cut down brick losses and extend Arch life.

You can now carry Arches of proper length and gain the resulting fuel economies.

Ask American Arch Company about this latest contribution to locomotive betterment.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.

INCORPORATED

60 East 42nd Street . . . . New York, N. Y.

Locomotive Combustion Specialists

ton Falls, Ravenna and Kent; a second train ran from Toledo with stops at Fostoria, Tiffin and the principal points en route to Akron and two trains ran from Cleveland to Akron without stop. Three trains handled passengers from the Akron Union Station to the air dock. Altogether 3,500 passengers were carried in a total of 60 coaches. All of the trains ran directly to the dock and discharged their passengers within easy walking distance of the point where the ceremonies took place.

Brotherhood Insurance Held Enforceable

The Missouri Supreme Court, on July 28, ruled that insurance contracts issued by the Brotherhood of Railroad Trainmen are enforceable and the grand lodge of that organization may be sued to compel enforcement of such contracts. The ruling was in an appeal from the St. Louis Circuit Court on a suit brought by W. H. Steed and C. B. Clark who started action against the brotherhood to enforce the provisions of insurance policies issued by the union to members, after these policies had been cancelled by the brotherhood. The union, when the suit was called for

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 171 Steam Railways, Including 17 Switching and Terminal Companies.

FOR THE MONTH OF JUNE, 1931 AND 1930

Item	United States		Eastern District		Southern District		Western District	
	1931	1930	1931	1930	1931	1930	1931	1930
Average number of miles operated	243,049.95	242,585.11	60,300.38	60,332.94	46,100.53	46,138.06	136,649.04	136,114.11
Revenues:								
Freight	$281,260,576	$331,637,809	$116,556,017	$143,653,288	$53,584,974	$59,211,077	$111,119,585	$128,773,444
Passenger	50,956,538	67,167,311	28,965,998	37,045,999	5,373,366	7,559,141	16,617,174	22,562,171
Mail	8,477,431	9,093,329	3,290,210	3,436,490	1,429,699	1,487,401	3,757,522	4,169,438
Express	7,886,348	10,389,487	3,835,666	4,856,858	1,020,414	1,325,554	3,030,268	4,207,075
All other transportation	12,439,365	15,318,439	7,328,778	9,194,506	853,176	961,706	4,257,411	5,162,227
Incidental	8,053,776	10,588,255	4,227,492	5,506,736	1,018,639	1,225,401	2,807,645	3,856,118
Joint facility—Cr.	1,070,030	1,082,458	323,235	344,578	211,151	226,012	535,644	511,868
Joint facility—Dr.	333,662	325,635	76,667	82,942	24,542	41,683	232,453	201,010
Railway operating revenues	369,810,402	444,951,453	164,450,729	203,955,513	63,466,877	71,954,609	141,892,796	169,041,331
Expenses:								
Maintenance of way and structures	52,008,782	66,821,805	21,388,367	28,260,382	9,219,865	10,726,944	21,400,550	27,834,479
Maintenance of equipment	69,341,218	85,369,868	31,919,463	39,665,237	12,693,129	15,267,173	24,728,626	30,437,458
Traffic	10,335,586	11,411,578	4,061,152	4,269,244	1,842,140	2,007,417	4,432,294	5,134,917
Transportation	130,024,760	151,429,483	60,929,420	71,792,281	21,158,689	24,115,957	47,936,651	55,521,245
Miscellaneous operations	3,579,751	4,510,370	1,740,627	2,143,916	361,963	451,301	1,477,161	1,915,153
General	15,478,997	16,310,352	6,764,315	7,248,208	2,715,174	2,794,473	5,999,508	6,267,671
Transportation for investment—Cr.	623,726	1,131,977	99,661	2[illegible],902	111,043	92,519	413,022	774,556
Railway operating expenses	280,145,368	334,721,479	126,703,683	153,1[illegible],366	47,879,917	55,270,746	105,561,768	126,336,367
Net revenue from railway operations	89,665,034	110,229,974	37,747,046	50,841,147	15,586,960	16,683,863	36,331,028	42,704,964
Railway tax accruals	27,492,261	31,103,729	11,436,492	13,402,493	4,977,893	5,508,699	11,077,876	12,192,537
Uncollectible ry. revenues	30,644	68,477	d 37,580	25,036	36,096	14,021	32,128	29,420
Railway operating income	62,142,129	79,057,768	26,348,134	37,413,618	10,572,971	11,161,143	25,221,024	30,483,007
Equipment rents—Dr. balance	9,026,921	7,938,400	4,284,050	4,201,699	611,257	110,696	4,131,614	3,626,005
Joint facility rent—Dr. balance	2,952,657	1,956,783	1,721,633	791,326	362,566	330,584	868,458	834,873
Net railway operating income	50,162,551	69,162,585	20,342,451	32,420,593	9,599,148	10,719,863	20,220,952	26,022,129
Ratio of expenses to revenues (per cent)	75.75	75.23	77.05	75.07	75.44	76.81	74.40	74.74

FOR SIX MONTHS ENDED WITH JUNE, 1931 AND 1930

Average number of miles operated	242,840.41	242,714.11	60,288.66	60,355.48	46,098.02	46,138.93	136,453.73	136,219.70
Revenues:								
Freight	$1,673,781,494	$2,042,492,697	$718,569,641	$893,406,792	$324,614,642	$387,112,269	$630,597,211	$761,973,636
Passenger	292,163,226	380,786,927	164,985,673	205,903,916	38,855,563	54,626,268	88,321,990	120,256,743
Mail	52,506,312	55,499,854	20,169,527	21,128,508	8,906,235	9,333,023	23,430,550	25,038,323
Express	46,162,533	60,933,579	19,366,268	27,571,638	8,192,107	9,616,137	18,604,158	23,745,804
All other transportation	73,000,504	90,291,718	42,481,750	52,646,288	5,633,964	6,994,944	24,884,790	30,650,486
Incidental	45,648,234	57,649,202	24,487,307	30,112,687	6,735,514	8,382,443	14,425,413	19,154,072
Joint facility—Cr.	5,803,738	6,609,332	1,875,080	2,180,507	1,054,601	1,209,684	2,874,057	3,219,141
Joint facility—Dr.	1,628,606	2,007,367	457,905	598,956	154,676	205,925	1,016,025	1,202,486
Railway operating revenues	2,187,437,435	2,692,255,942	991,477,341	1,232,351,380	393,837,950	477,068,843	802,122,144	982,835,719
Expenses:								
Maintenance of way and structures	288,090,526	375,703,238	120,488,428	154,649,776	55,057,929	68,824,599	112,544,169	152,228,863
Maintenance of equipment	441,497,751	546,145,752	205,156,714	253,668,890	79,732,513	98,797,767	156,608,524	193,679,095
Traffic	60,671,906	66,700,864	23,332,730	25,469,175	11,287,270	12,303,519	26,051,906	28,928,170
Transportation	814,148,878	965,603,696	384,667,645	456,667,687	135,156,583	157,320,899	294,324,650	351,615,110
Miscellaneous operations	21,840,972	27,323,656	10,650,298	13,015,348	2,748,103	3,575,247	8,442,571	10,733,061
General	93,966,923	98,761,837	40,971,994	43,300,332	16,407,298	16,642,195	36,587,631	38,819,310
Transportation for investment—Cr.	3,442,766	6,290,643	614,581	1,243,909	390,760	585,612	2,437,425	4,461,122
Railway operating expenses	1,716,774,190	2,073,948,400	784,653,228	945,527,299	299,998,936	356,878,614	632,122,026	771,542,487
Net revenue from railway operations	470,663,245	618,307,542	206,824,113	286,824,081	93,839,014	120,190,229	170,000,118	211,293,232
Railway tax accruals	164,738,626	180,298,589	66,304,946	74,118,000	32,229,199	35,213,573	66,204,481	70,967,016
Uncollectible ry. revenues	379,038	514,953	129,975	213,867	88,831	86,570	160,232	214,516
Railway operating income	305,545,581	437,494,000	140,389,192	212,492,214	61,520,984	84,890,086	103,635,405	140,111,700
Equipment rents—Dr. balance	51,490,981	47,329,842	25,271,854	24,319,492	4,529,247	1,730,470	21,689,880	21,279,880
Joint facility rent—Dr. balance	15,504,460	12,784,946	8,606,843	6,189,389	1,632,603	1,400,443	5,265,014	5,195,114
Net railway operating income	238,550,140	377,379,212	106,510,495	181,983,333	55,359,134	81,759,173	76,680,511	113,636,706
Ratio of expenses to revenues (per cent)	78.48	77.03	79.14	76.73	76.17	74.81	78.81	78.50

d Deficit or other reverse items.

Compiled by Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

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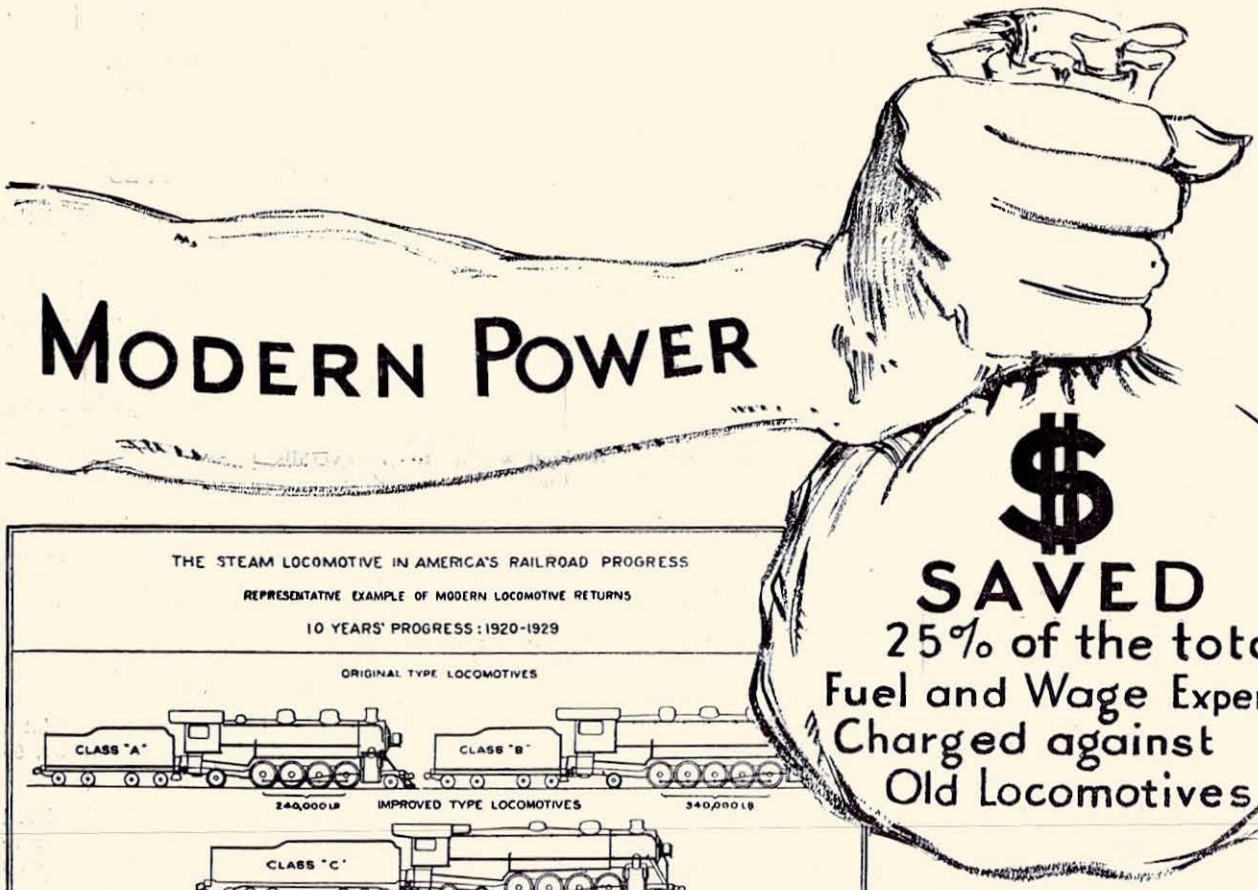
MODERN POWER



$ SAVED
25% of the total Fuel and Wage Expense Charged against Old Locomotives

Here Take it

To Economize Modernize

IT'S YOURS if you modernize. We say modern power will do and save only what it has done and is doing in actual service. The above chart represents a typical example of how one railroad saved 25 per cent in transportation expense by modernizing.

Here are the facts. 30 locomotives designated as Class "A" were in freight service on divisions of 101 and 83 miles; 34 locomotives designated as Class "B" were in service on adjacent divisions of 114 and 89 miles respectively. 50 locomotives of new design and with greater power designated as Class "C", replaced these 64 older locomotives and handled the same tonnage, on faster schedule and with longer engine runs over two divisions combined, namely: 184 and 203 miles at a saving of 25 per cent in transportation expense.

A 25 per cent saving in these days is big enough to justify a thorough examination of your equipment. Modernize—the profits now lost will pay the cost.

American Locomotive Company
30 Church Street New York N.Y.

trial, filed a demurrer on the grounds that it was a voluntary unincorporated association and therefore not actionable at law. The demurrer was upheld by the St. Louis court, which decision was overruled by the Supreme Court and the case remanded for trial.

Texas & Pacific Brings in Oil Well

The Texas & Pacific, on July 31, brought in a 30,000-bbl. oil well on its right of way near Longview, Tex.

Test Locomotives on the B. & O. —A Correction

An article describing the four test locomotives recently placed in service on the Baltimore & Ohio was published in the July 11, 1931, issue of the *Railway Age*, page 46. It was stated on page 48 that "the specialties applied to all four locomotives include Elesco exhaust-steam injectors, Lower stokers, Barco power-reverse gears, etc." This statement is partially incorrect. These locomotives were equipped with Sellers Type BF exhaust feedwater heaters on the right side and Sellers Class K non-lifting injectors on the left side.

During the period of the test an Elesco exhaust-steam injector was applied to locomotive No. 5510, Class T-1, and is still applied. Three locomotives, Classes T-1, KK-1 and KK-2, have the Barco power reverse gear, while locomotive No. 5550, Class T-2, is equipped with the Precision gear.

Increased Sale of "Single Occupancy" Sections

During July the Pullman Company set a new record in the sale of single occupancy sections in sleeping cars when during the first 24 days of the month, 56,818 sales were made, as compared with 35,673 during the same period of 1930 and 5,644 during the first 24 days of July, 1929. The 1929 figures cover the occupancy of sections before the new rate was placed in effect. In 1930 the rate was in its first year and the volume of transactions was increased 532 per cent. This year the volume of section transactions has increased 907 per cent over 1929.

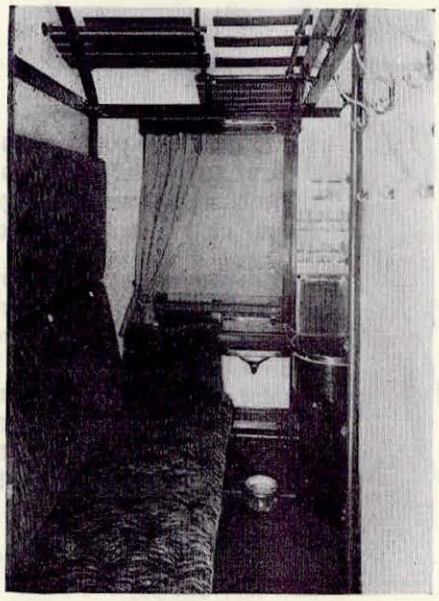
Western Grain Case Appealed to Supreme Court

The western railroads have taken to the Supreme Court their effort to ascertain whether Section 15a of the interstate commerce act, with its reference to a fair return on railroad valuation, means anything; or whether the Interstate Commerce Commission may continue to prescribe what it calls "reasonable" rates on important classes of traffic without regard to the fact that the roads have not been earning such a fair return. On August 8 they filed in the Supreme Court at Washington an appeal from the decision of the federal court at Chicago which recently denied their application for an injunction to restrain the commission from putting into effect its order prescribing a general reduction in grain rates. The court had issued a temporary injunction but later dissolved it and the rates went into effect on August 1. "In prescribing the lowest possible rate on grain and grain products as the maximum reasonable rate the order of the commission, say the roads, will prevent them from earning as nearly as may be the rate of return required by the interstate commerce act." They also allege that the commission erred in construing the provisions of Section 15a "as a mere permission to the carriers to earn a fair return."

Steering Committee Named for Dallas Hearing

A steering committee to present evidence before the Interstate Commerce Commission hearings on the proposed 15 per cent railroad freight rate increase to be held at Dallas, Tex., on August 21, in opposition to the raise, was named at a meeting of the Southwestern Industrial Traffic League, the Texas Traffic Bureau and a group of shippers and traffic managers, called by C. B. Bee of the Oklahoma Corporation Commission. These groups have petitioned the interstate Commerce Commission to reconsider its ruling that it will not consider wages of railroad employees. It is contended that compensation or railroad employees was fixed at a time when conditions were far different, substantial changes having since been made in the cost of living; and the Transportation act of 1920 provides that the railroads must be efficiently and economically operated as a precedent to their right to invoke relief. Investigation is asked of salaries of officers and employees, excess passenger train service and other possible sources of undue expense. The steering committee includes: Frank A. Leffingwell, secretary-treasurer of the Southwestern and Texas League, as chairman; Mr. Bee; E. R. Tanner of El Paso, and A. D. Beals of the Arkansas Railroad Commission.

* * *



Interior of Third-Class Sleeping Car, Swedish State Railways

Arranged as shown, for daytime use, this compartment seats four people, while at night three sleeping berths are provided, the charge for each being five kroner ($1.34) per night for any distance.

Equipment and Supplies

LOCOMOTIVES

THE PENNSYLVANIA has authorized the construction of 20 locomotive tenders to have a capacity of 25,000 gal. of water and 25 tons of coal. This work is to be carried out at its Altoona shops as announced by F. G. Grimshaw, works manager, Altoona.

THE JAY STREET CONNECTING RAILROAD, Brooklyn, N. Y., has bought, after a 60-day trial, one 300-hp. oil-electric locomotive from the American Locomotive Company. This is the first locomotive of the new design of oil-electrics equipped with the Alco type McIntosh & Seymour diesel engine, now being brought out by the American Locomotive Company.

FREIGHT CARS

THE NEW YORK CENTRAL contemplates building from 200 to 300 gondola cars, 65 ft. long, in its own shops.

THE NORTHERN PACIFIC has ordered 500 underframes and 500 superstructure parts for 40-ton single sheathed box cars which it will build in its own shops, from the Pressed Steel Car Company. Inquiry for this equipment was reported in the *Railway Age* of July 18.

MOTOR COACHES

THE BOSTON & MAINE has received two type Y 29-passenger parlor Yellow coaches from the General Motors Truck Company.

THE BALTIMORE & OHIO has received six type U 16-passenger parlor Yellow coaches from the General Motors Truck Company.

THE CENTRAL TRANSPORTATION COMPANY, subsidiary of the Illinois Central, has received one type Z 29-passenger observation Yellow coach from the General Motors Truck Company.

SIGNALING

THE CANADIAN PACIFIC has ordered from the General Railway Signal Company material for a centralized traffic control installation at Vaudreuil, Que.

THE BALTIMORE & OHIO has ordered from the General Railway Signal Company apparatus for a table interlocking at Harpers Ferry, W. Va.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered from the Union Switch & Signal Company 10 Union automatic cab signal equipments for use on electric locomotives which run to the Pennsylvania station, New York City. These locomotives run over Pennsylvania tracks from Sunnyside, Long Island, through the

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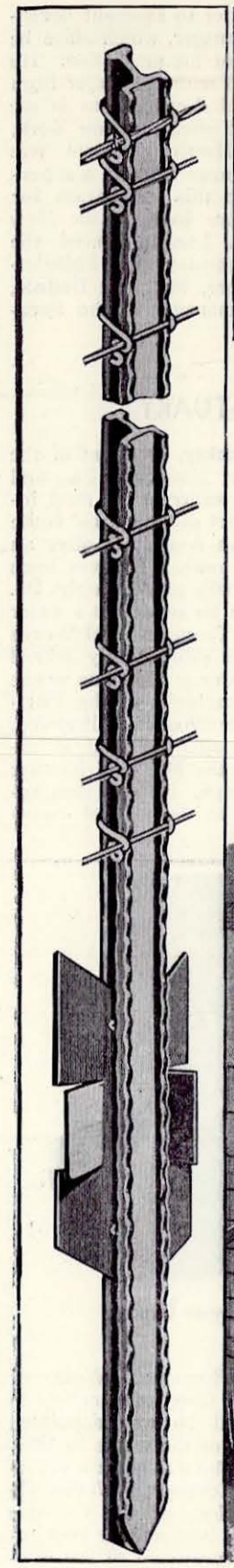
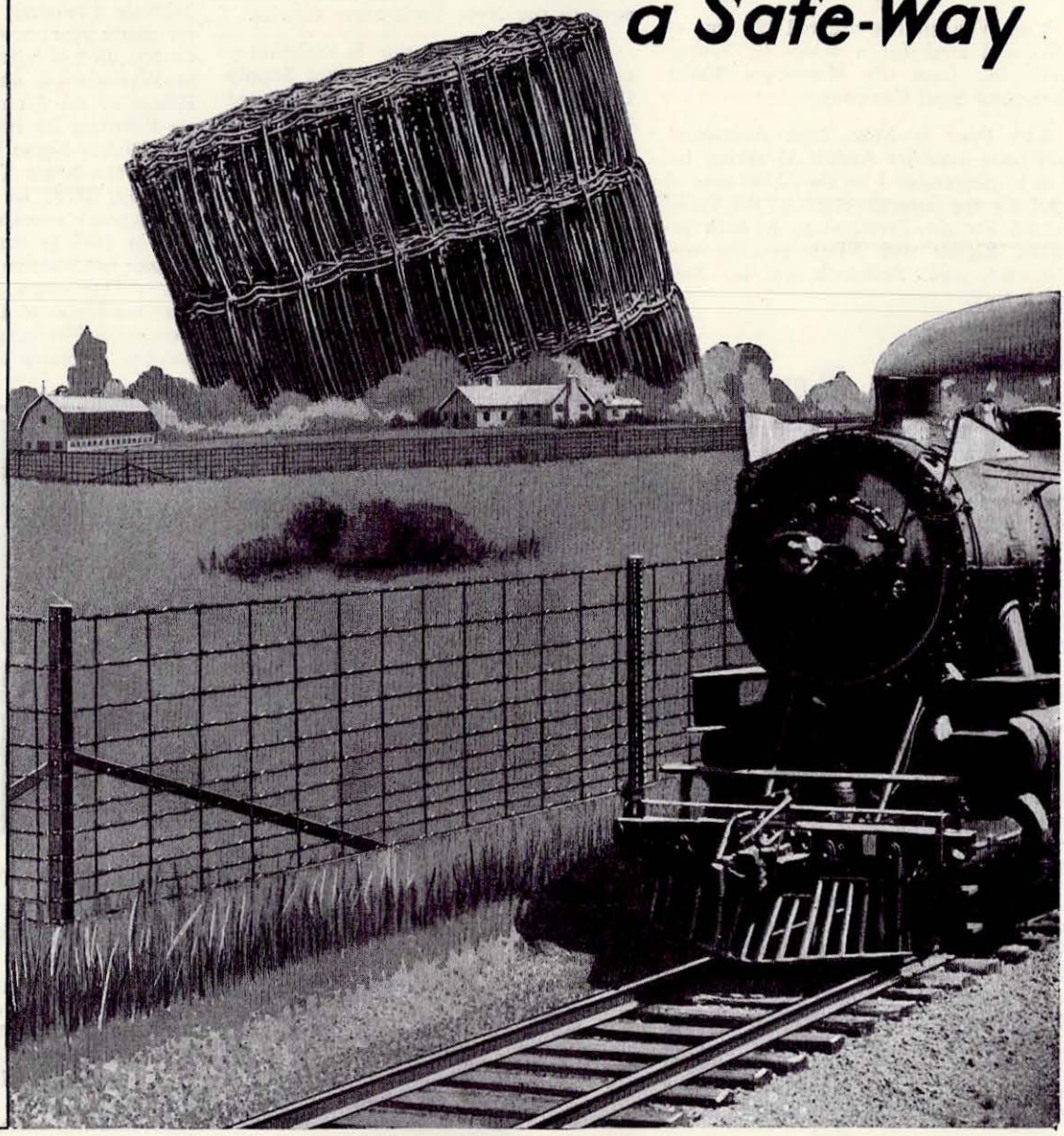


AMERICAN Fence and BANNER STEEL POSTS

IT is cheaper to put up a good fence than to pay stock claims. Likewise it is economy to buy adequate protection—proved protection—such as that offered by American Railroad Fence and Banner Steel Line Posts—the post of railroad rail construction. These products including National Expanding Anchor End and Corner Posts meet every specification recommended by the American Railway Engineering Association.

Make Your Right-of-Way- - a Safe-Way



1831 COMMEMORATING AMERICAN STEEL & WIRE COMPANY 100 YEARS of PROGRESS IN WIRE MAKING 1931

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago SUBSIDIARY OF UNITED STATES STEEL CORPORATION And All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco *Export Distributors:* United States Steel Products Company, New York

East River tunnels to the Pennsylvania station.

THE NEW YORK CENTRAL has ordered from the General Railway Signal Company 470 light signals, type SA, and other material, for replacing the signals on 38 miles of line; High Bridge, N. Y. northward to Ossining, and Morrisiana northward to White Plains. The order includes 1034 relays, type K; 790 relays type N; 155 transformers; 89 apparatus houses and other material.

IRON & STEEL

THE SOUTHERN PACIFIC has ordered 210 tons of structural steel for a bridge at San Francisco, Cal., from the Virginia Bridge & Iron Company.

THE WABASH has ordered 195 tons of structural steel for a bridge at Springfield, Ill., from the Mississippi Valley Structural Steel Company.

THE PORT OF NEW YORK AUTHORITY will issue inquiries August 15 asking for bids by September 1 on the 22,500 tons of steel for the superstructure of the Union Inland Freight Terminal to be built between Eighth and Ninth avenues and Fifteenth and Sixteenth streets, New York City.

Supply Trade

The Pressed Steel Car Company, Pittsburgh, Pa., has awarded a contract to the Austin Company for the recon-

of 280 tons of structural steel will be required, while the cost of repairing the buildings will approximate $60,000.

Howard M. Cryder and **Warne R. Carmichael** have been appointed receivers for the **Carmichael-Cryder Company, Inc.,** St. Louis, Mo. The receivership petition filed by a stockholder contends that the firm is solvent but does not have sufficient cash on hand to meet current obligations. The firms assets total $110,000 and liabilities $72,500.

The A. M. Byers Company, Pittsburgh, Pa., has taken a six-months option to purchase the **Canonsburg Steel & Iron Works,** Canonsburg, Pa. The latter company which is controlled by the Edwards Manufacturing Company, Cincinnati, Ohio, was founded in 1902 and has an annual capacity of 38,000 tons of black sheets and 16,000 tons of galvanized sheets.

The Robert W. Hunt Company, Chicago, has installed an X-ray laboratory service for the inspection and testing of metallic materials. These facilities are designed to X-ray steel objects up to 3½ in. in thickness and aluminum objects up to 8 in. in thickness, while there is no limit to the size of the specimens that may be tested providing they can be loaded on a freight car.

J. A. Kiggen, Jr., New York State manager of **The White Company,** has been promoted to sales manager of the motor coach division, with headquarters at Cleveland, Ohio, a newly-created position. Mr. Kiggen entered the employ of the White organization in July, 1921, when he enrolled in the technical-apprentice course. Upon the completion of this course, he was assigned to the Cleveland repair department, serving successively as foreman and general foreman. He was later transferred to the export department, of which he became service manager. His next promotion made him assistant to the vice-president of the Eastern region, from which position he was promoted to that of manager of the New York State district.

An involuntary petition in bankruptcy against the **Walter A. Zelnicker Supply Company** has been filed in the United States District court in St. Louis, Mo., by the Craig Corporation, Chicago, the Spence M. Howe Construction Company, Port Arthur, Tex., and George Predergast, St. Louis, who allege that the company made a preferred payment of $100 to the Continental Oil Company. This action follows the appointment of a receiver by Circuit Judge Granville Hogan of St. Louis under a petition filed in the state court by Walter A. Zelnicker, president, who stated that the company is a going concern with assets of $200,000 and debts of only $102,000, and that a receiver was necessary to preserve its property against threatened suits.

T. R. Langan has been appointed district manager of the **Electric & Manufacturing Company,** with headquarters at New York City. Mr. Langan has been with the Westinghouse Company for more than twenty years. Starting as an apprentice in the engineering department,

T. R. Langan

he advanced through the construction, service and sales departments of the company to the office of manager of the transportation division of the northeastern district and later to assistant northeastern district manager, which office he held at the time of his promotion. He has been identified with the major high voltage a.c. railroad electrifications in the United States, and when the New York, New Haven & Hartford system was electrified, Mr. Langan acted in a supervisory capacity on this installation for three years. Before going to the New York Office, Mr. Langan served the Westinghouse company in Philadelphia, Pa., Baltimore, Md., and Buffalo, N. Y., and was manager of the Syracuse, N. Y. office.

OBITUARY

Alva Clymer Dinkey, president of the Midvale Company, Nicetown, Pa., and for many years a leader in the steel industry, died of heart disease at his home at Wynnewood, on August 11 after an illness of three months. He was born on February 20, 1866, at Weatherly, Pa. Mr. Dinkey began his service as a water boy at the Edgar Thomson Steel Works in May, 1879; he subsequently served as telegraph operator at the same works and in 1885 as machinist at the Pittsburgh Locomotive Works, Allegheny, Pa. Three years later he went as expert machinist to the McTighe Electric Company, Pittsburgh. He was then appointed secretary to the general superintendent of the Homestead Works of the Carnegie Steel Company, serving in that position until he was appointed electrical engineer of the works in 1893. From 1901 to 1903 he was general superintendent of the Homestead Works. He was elected president of the Carnegie Steel Company in 1903 and in 1915 resigned to become president of the Midvale Steel & Ordnance Company. He later became president of the Midvale Company. Mr. Dinkey, in addition to being a director of the American Iron & Steel Institute, was a member of a number of technical societies and was also interested in several banks and industrial organizations.

Alva Clymer Dinkey

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GEO

insures DOUBLE SATISFACTION

GEO . . the modern solution to track problems . . guarantees satisfaction from two distinct angles. For the passenger is provided smooth and practically noiseless track, greater speed and greater safety. This should be reason enough to dictate the selection of GEO. What is more important than passenger satisfaction? Yet this modern method of track construction has many other points of superiority. Control of rail movement, reduction in rail wave motion, longer life of rails and ties, radically reduced maintenance costs . . . . these are advantages which maintenance of way men cannot afford to overlook.

G E O is not a new, experimental device. Many thousands of miles of G E O track have been laid in Europe during the past five years and new construction is adding several thousand miles yearly. Here in America, test sections on leading railroad systems are demonstrating G E O to be the most important contribution to railroad track construction of the past decade.

Descriptive literature will be sent at your request, and Carnegie Engineers are at your service at all times.

CARNEGIE STEEL COMPANY - PITTSBURGH

Subsidiary of United States Steel Corporation

143

GEO TRACK CONSTRUCTION

Financial

ATCHISON, TOPEKA & SANTA FE.—*Bonds.*—The Interstate Commerce Commission has authorized the North Plains & Santa Fe to issue a first mortgage 6 per cent, series A, bond for $4,000,000, to be delivered to the Atchison, Topeka & Santa Fe in satisfaction of advances for capital expenditures.

CHICAGO, ATTICA & SOUTHERN.—*Receivership.*—Charles F. Propst, president, has been appointed receiver of this railroad by Judge T. W. Slick of the United States District court at South Bend, Ind. The receivership of the 120-mile line, extending from Lacrosse to West Melcher, with a branch extending from Percy Junction to the Indiana-Illinois line in Newton county, followed a suit filed by Burton D. Roy to collect a $10,000 note which he holds against the railroad. The petitioner asserts the line is insolvent and unable to pay its indebtedness and requests operation be continued in the hope that creditors eventually may realize something on their claims.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line between Green and White Pine Junction, Mich., 11 miles, to abandon operation over the Ontonagon Railroad between Ontonagon and White Pine, and to acquire 2.54 miles of the Ontonagon.

CHICAGO & NORTHWESTERN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon the branch line extending from Casson, Minn., northward to Mantorville, 2.9 miles.

DETROIT, TOLEDO & IRONTON.—*I.C.C. Examiner Recommends Against Unification Plan.*—Examiner A. C. Devoe of the Interstate Commerce Commission, in a proposed report, has recommended that the commission deny this company's application for authority to acquire the properties of the Detroit & Ironton and the Toledo-Detroit, which it now controls, under a plan for bringing them under the ownership of a single corporation, pursuant to an agreement with the Pennroad Corporation, which controls the D.T. & I. The company also proposed to issue 180,336 shares of common stock and $10,776,000 of first and refunding bonds in connection with the proposed reorganization. Denial is recommended on the ground that to grant the application would, in effect, be recognizing the Pennroad Corporation as the lawful owner of the securities in exchange for which the proposed securities are to be issued and the acquisition by the Pennroad of control of the applicant and its affiliated companies as a lawful acquisition, in the interest of the Pennsylvania, although the commission has allocated the properties to other systems in its consolidation plan. The plan allocated an undivided half interest in the D. T. & I. to the Wabash-Seaboard system and a like interest to the Baltimore & Ohio system. Whether control by the Pennsylvania is compatible with the public interest, the examiner says, can be determined only after appropriate proceedings under the applicable provisions of the law.

HARRIS COUNTY-HOUSTON SHIP CHANNEL NAVIGATION DISTRICT.—*Acquisition and Operation.*—This municipal corporation of Houston, Tex., has been authorized by the Interstate Commerce Commission to acquire under lease the line of the Northside Belt Railway in the neighborhood of the Houston Ship Channel, 4.9 miles; the construction of a connecting line, 2 miles long, across Green's Bayou; and the acquisition of a 1.2-mile line of the Houston North Shore Railway Company. The Texas & New Orleans, the International-Great Northern, the St. Louis Brownsville & Mexico, the Beaumont Sour Lake & Western, the Gulf Colorado & Santa Fe, the Missouri-Kansas-Texas of Texas and the Burlington-Rock Island have been authorized to operate over these lines under trackage rights.

LEHIGH & NEW ENGLAND.—*Final Valuation.*—The Interstate Commerce Commission has issued a final valuation report finding the final value for rate-making purposes as of 1919 to be $11,579,900.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—*Bonds.*—The Interstate Commerce Commission has authorized this company to procure the authentication and delivery of $12,500,000 of its first refunding mortgage, series B, 5½ per cent bonds upon surrender of a similar amount of first refunding mortgage 6 per cent, series A, bonds.

NEW YORK CENTRAL.—*Acquisition of Detroit Manufacturers R. R.*—The Interstate Commerce Commission has authorized the Michigan Central and the New York Central, its lessee, to acquire control by lease of the Detroit Manufacturers Railroad, a single track line about 2 miles long serving the industries along the Detroit River.

PERE MARQUETTE.—*Tentative Recapture Report.*—The Interstate Commerce Commission has made public a tentative recapture report accompanied by an order directing this company to pay $820,512 into the recapture fund, unless protest is filed by September 16, as representing one-half of the net railway operating income in excess of 6 per cent earned in the years 1922, 1923 and 1925. For 1920, 1921 and 1924 no excess income was found. The excess income was calculated on a final value of $96,500,000 for 1922, $100,500,000 for 1923, and $111,500,000 for 1925. The company had claimed a valuation ranging from $122,421,766 for 1920 to $219,438,083 for 1925.

Average Prices of Stocks and of Bonds

	Aug. 11	Last week	Last year
Average price of 20 representative railway stocks.	61.58	63.25	110.63
Average price of 20 representative railway bonds..	88.33	90.25	94.92

Dividends Declared

Canadian Pacific.—Preferred, $2, semi-annually; common 31¼c, both payable October 1 to holders of record September 1.

Construction

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—About September 1 this company plans to commence work on the construction of a 450-ft. pontoon bridge across the Mississippi river at Wabasha, Minn. This project, which has an estimated cost of $65,000, will be undertaken with company forces.

COLORADO & SOUTHERN.—This company plans to call for bids in the near future for the construction of a truss span to replace the pile trestle portion of its bridge across the Arkansas river at Pueblo, Colo. The contracts will involve the construction of a concrete pier and the erection of a 230-ft. truss span.

GULF, COLORADO & SANTA FE.—A contract has been awarded to the A. J. Rife Construction Company, Dallas, Tex., for the construction of a 24-ft. by 192-ft. warehouse addition to this company's shops at Cleburne, Tex.

INTERNATIONAL GREAT NORTHERN.—This company contemplates the construction of a street subway under its East Rosedale extension at Ft. Worth, Tex., to cost about $30,000. The subway will carry two 30-ft. openings for street vehicles and two 6-ft. side-walks, and will be skewed 42 deg.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—This company has recently awarded contracts for the construction of highway grade separation structures at the following points in Wisconsin: Clayton, to C. R. Meyer & Sons, Oshkosh, Wis., $40,000; Clarke, to A. R. Coffeen, Madison, Wis., $40,000; Auburndale and Oshkosh, to the Appleton Construction Company, $50,000 and $55,000 respectively.

MISSOURI-KANSAS-TEXAS. — ST. LOUIS SOUTHWESTERN.—These roads expect to commence work in the near future on the construction at Waco, Tex., of a 280-ft. subway to carry Seventh street under their tracks, at an estimated cost of $75,000. A portion of the work will be done under contract and the remainder by railway company forces.

RUTLAND.—The New York Public Service Commission has approved an estimate of cost in the amount of $84,100, in connection with the reconstruction of the bridge carrying the tracks of this road over the Chateaugay-Franklin County Line highway at Chateaugay, N. Y. Specifications, superstructure plans and detail masonry plans in connection with this project were also approved.

THE SOUTHERN has quickened the schedules of its southbound trains, No. 35 and No. 29. No. 35, Washington to New Orleans, leaves Washington at 1:35 p.m. instead of 11 a.m., reaches Atlanta only 30 minutes later than formerly, and New Orleans the same as before. No. 29, the Birmingham Special, leaving Washington at 4:45 p.m. makes the trip to Birmingham 35 minutes quicker.

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For permanence

The trend of the times is to build for permanence. Now, as never before, care is devoted to selecting products that will last longer.

In keeping with this movement, more and more culvert buyers are turning to Toncan Culverts. For Toncan, with its pure iron base, plus copper, plus molybdenum, represents the most advanced culvert material yet produced. Exhaustive tests have proven that this skillfully alloyed iron far surpasses any competitive product in rust and corrosion resisting qualities. Assistance in solving your particular drainage problems will be gladly given without charge.

TONCAN CULVERT
MANUFACTURERS' ASSOCIATION
MASSILLON, OHIO

Plants in All Parts of United States and Canada

Plain or Perforated

for

Railroads
Golf Courses
Aviation Fields
Storm Water Sewers
Suburban Gutters
Sanitary Sewers
Highways

Railway Officers

EXECUTIVE

Hale Holden, Jr., assistant to the president of the Pullman Company, has been elected vice-president of the Pullman Company. He entered the employ of the Pullman Company on September 15, 1922, as a draftsman at the Pullman Car Works, Pullman, Ill., and on January 1, 1923, was transferred to car building and worked in various capacities in both the passenger and freight shops. Later he became an inspector in the mechanical department and then a clerk in the office of the vice-president and general manager. On January 1, 1924, he was placed in the sales department, but returned to the operating department six months later as assistant district superintendent of

H. Holden, Jr.

the central zone, and later in the Chicago Eastern-Southern and Central districts. On February 1, 1925, he returned to sales work with the Pullman Car & Manufacturing Corporation, and five years later became assistant to the president of the Pullman Company which position he held until his recent appointment.

FINANCIAL, LEGAL AND ACCOUNTING

H. B. Stewart, Jr., vice-president of the Akron, Canton & Youngstown and the Northern Ohio, with headquarters at Akron, Ohio, has been appointed also assistant secretary of these roads.

T. T. Weedman has been appointed auditor of passenger receipts of the Denver & Rio Grande Western, with headquarters at Denver, Colo., succeeding **J. F. Howe.**

James C. Wallace, who has been appointed general auditor disbursements of the New York Central at New York, was born in Battle Creek, Mich., and entered railroad service with the Michigan Central in 1903, continuing with that road until 1906. In 1906, he became connected with the Delaware, Lackawanna & Western and from 1909 to

J. C. Wallace

1911, he served as examiner for the I.C.C. at Washington, D. C. In the latter-mentioned year he entered the service of the Big Four as auditor of disbursements. In 1912 he was appointed assistant auditor, and from 1918 to 1920, he was assistant federal auditor of that road, with headquarters in Cincinnati. He was appointed auditor of the Big Four in 1920, and in 1924, his title was changed to general auditor, the position he held until August 1. In addition to serving as general auditor of the Big Four, he was auditor of a number of subsidiary companies, and also of the Cincinnati Union Terminal Company.

G. M. Glazier, recently appointed general auditor revenues of the New York Central, with headquarters at New York, was born on September 11, 1871, at

G. M. Glazier

Erie, Pa. He began his railroad career in 1890 as auditor of the Norfolk, Albermarle & Atlantic and when that road was merged with the Norfolk & Southern, he was appointed auditor of the latter, which position he held until March, 1906. Between the period 1904 to 1906, he also served as assistant general manager. In March of the latter year, he became connected with the New York Central Lines as assistant to financial vice-president at New York. During the period between August 1909 and January 1910, he was assistant auditor Lake Shore & Michigan Southern (now a part of the N.Y.C.), at Cleveland, Ohio. In January, 1910, he became auditor, New York Central Lines west of Buffalo, including the Lake Shore & Michigan Southern, the Chicago, Indiana & Southern, the Lake Erie, Alliance & Wheeling, the Dunkirk, Allegheny Valley & Pittsburgh, the Cleveland Short Line and the Lake Erie & Pittsburgh. From 1915 to 1918, he was assistant general auditor, New York Central, and during Federal control he served as assistant federal auditor for that road. In March, 1920, he returned to the N. Y. C., as auditor and also served in that capacity for the Ottawa & New York. In 1925, he was promoted to general auditor of the N. Y. C., the position he held until his recent advancement.

OPERATING

Following the consolidation of the Chapleau and Schreiber divisions of the Canadian Pacific into one division, known as the Schreiber division, **R. A. Sewell,** superintendent of the former Schreiber division, has been appointed superintendent of the combined divisions, with headquarters as before at Schreiber, Ont. **W. R. Boucher,** superintendent of the Chapleau division, with headquarters at Chapleau, Ont., has been appointed relieving superintendent, with no designated headquarters. **F. Davis,** assistant superintendent of the Trenton division, with headquarters at Toronto, Ont., has been transferred to the new Schreiber division, with headquarters at Chapleau, where he succeeds **C. H. Towle,** assigned to other duties. Coincident with the abolition of the Souris division and the absorption of its territory by the Portage and Brandon divisions, **A. C. Harshaw,** superintendent of the former division, with headquarters at Souris, Man., has retired.

TRAFFIC

L. E. Mercer has been appointed district freight agent of the Wabash, with headquarters at Winston-Salem, N. C.

G. R. Reynolds has been appointed general agent for the Ann Arbor, at Seattle, Wash., succeeding **I. W. Dudley.**

Francis A. Haas has been appointed general agent for the Chicago & North Western at Boston, Mass., to succeed **C. W. Gray,** resigned.

W. L. Higgins, traveling passenger agent of the Wabash, with headquarters at Kansas City, Mo., has been promoted to district passenger agent, with headquarters at New Orleans, La.

Continued on Next Left Hand Page

BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

A. L. Browne, assistant to the president and traffic manager of the Manufacturers Railway, has been appointed traffic manager of this road and of the St. Louis & O'Fallon, with headquarters as before at St. Louis, Mo.

W. H. Connor, general agent for the Union Pacific at Cincinnati, Ohio, will retire from active service on September 1. Mr. Connor's duties will be taken over by **F. B. Swope,** traveling freight agent at Cincinnati, who will become general agent in charge of freight traffic and **J. W. Orr,** district passenger agent at that point, who will become general agent in charge of passenger traffic.

B. K. Brenan, general freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, Ohio, has been promoted to assistant traffic manager, with headquarters at St. Louis, Mo., and has been succeeded by **W. L. Dewey,** assistant general freight agent at Cincinnati, who in turn has been succeeded by **J. H. Bauer,** assistant general freight agent in charge of coal and coke movements at Cincinnati. **Joseph A. Keegan,** chief of the tariff bureau, with headquarters at Cincinnati, has been assigned the position vacated by Mr. Bauer. **Willard F. Bryson** has been appointed chief of the tariff bureau at Cincinanti, to succeed Mr. Keegan.

ENGINEERING AND SIGNALING

J. B. Akers, assistant to vice-president of the Southern, has been appointed assistant chief engineer, with supervision over maintenance of way and such duties as may be assigned to him. Mr. Akers formerly had charge of engineering work.

O. D. Colaw, engineer maintenance of way on the Southern, with headquarters at Macon, Ga., has been transferred to Chattanooga, Tenn., succeeding **R. Hayes,** who has been appointed assistant engineer of bridges, Lines West, with headquarters at Cincinnati, Ohio. The position of engineer maintenance of way at Macon has been abolished and the territory placed under the jurisdiction of the Chattanooga office.

W. W. Benny, division engineer of the Ottawa division of the Canadian Pacific, with headquarters at Ottawa, Ont., has been appointed to the same position on the combined Ottawa and Smith's Falls division, known as the Smith's Falls division, with headquarters at Smith's Falls, Ont. **J. R. Caswell,** division engineer of the former Smith's Falls division, at Smith's Falls, has been transferred to the Montreal terminals, at Montreal, Que., where he succeeds **J. A. MacKenzie,** who has been assigned to other duties. **L. S. Rudder,** division engineer of the Bruce division, with headquarters at Toronto, Ont., has been appointed assistant division engineer of the Trenton division with the same headquarters, following the consolidation of the Bruce division and the Toronto Terminals division.

MECHANICAL

J. F. Batson, general car inspector of the Eastern region of the Pennsylvania, with headquarters at Harrisburg, Pa., has been appointed assistant master mechanic of the Pittsburgh division, with the same headquarters. **J. S. Richards,** master mechanic of the Buffalo division, has had his jurisdiction extended to include the Renovo division. **F. W. Anderson,** general foreman of the Pittsburgh division, has been made foreman of car shops of the Cleveland division, the position of general foreman being abolished. **J. W. Myers,** assistant road foreman of engines of the Cleveland division, retired on July 1.

OBITUARY

H. E. Speaks, assistant to the general superintendent of the New York Central, with headquarters at Columbus, Ohio, died suddenly on August 9, at Cadillac, Mich.

Axel Strand, district general car foreman of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Tacoma, Wash., died at Miles City, Mont., on July 2 from heart failure while on an inspection trip.

Charles F. Luddington, who resigned as fuel superintendent of the Chicago, Milwaukee, St. Paul & Pacific in 1925, died on August 4 from carbon monoxide poisoning while working on his automobile.

S. T. Wagner, consulting engineer of the Reading, died suddenly at his home in Philadelphia, Pa., on August 7. Mr. Wagner was born on August 30, 1861, at Philadelphia, and was graduated from

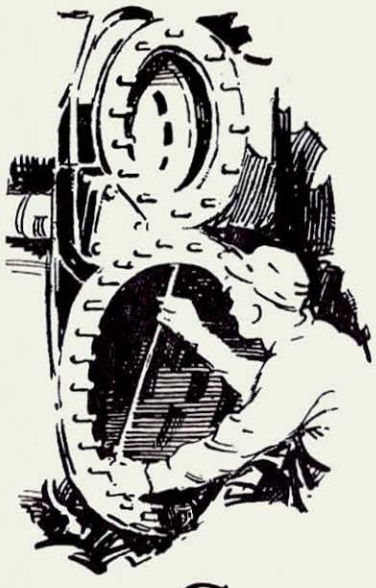
S. T. Wagner

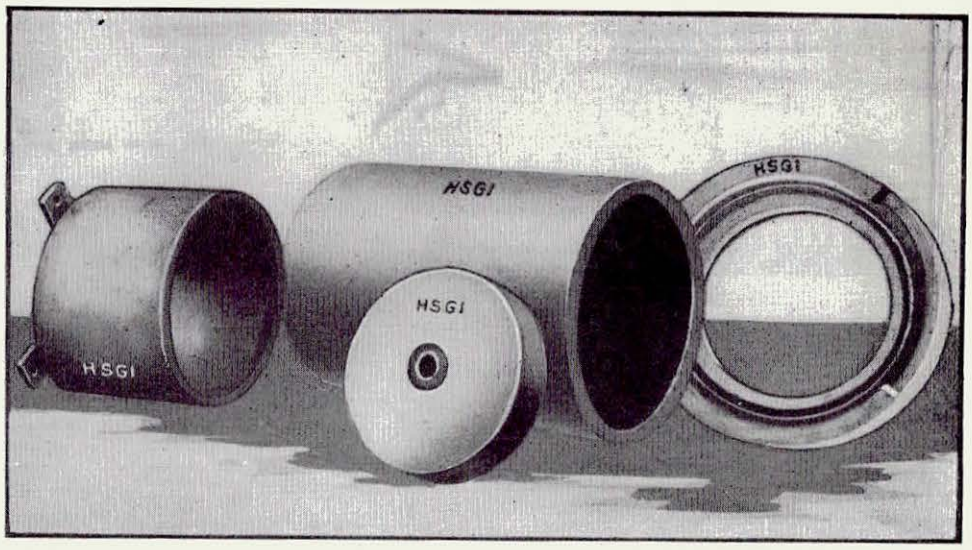
the University of Pennsylvania in 1881. From 1881 until 1893, he was with the Phoenix Iron Company, starting as a draftsman, then becoming inspector, assistant master mechanic and finally superintendent of shops. From 1894 until 1900, Mr. Wagner was assistant engineer in charge of the Pennsylvania avenue subway and tunnel, and from the latter date until 1902, was assistant engineer in charge of improvement and filtrations of water supply, being appointed to both divisions by the Bureau of Surveys of Philadelphia. He entered the service of the Philadelphia & Reading (now the Reading) on March 1, 1902, and from that time until 1915, was in charge of the abolishment of grade crossings of that company. On April 6, 1915, he was appointed chief engineer, which position he held until January, 1927, when he retired from active duty, and became consulting engineer of the Reading, in which capacity he served until his death.

A. R. Raymer, assistant vice-president (operating) of the Pittsburgh & Lake Erie, with headquarters at Pittsburgh, Pa., died at his home in Beaver, Pa., on August 10, following a long illness. Mr. Raymer was born on December 1, 1862, in Canada, and was educated at Toronto University, Toronto, Canada. He entered railway service in 1884, on a road that is now part of the Canadian National

A. R. Raymer

and was on location and construction from Gravenhurst to North Bay, Ont. From 1886 to 1889, he was on location and construction with the International Railway of Maine (now a part of the Canadian Pacific). During 1889, he was on location on a part of the Canadian National from Waterloo to Elmira, Ont., and from 1889 to 1891, he worked for the Louisville & Nashville on the construction of the Cumberland Valley extension from Cumberland Gap to Big Stone Gap. Mr. Raymer was with the Lake Shore & Michigan Southern (now part of the New York Central) from 1891 to 1896 at Toledo, Ohio, as assistant engineer on maintenance in charge of office and field surveys. In 1896 he entered the service of the Pittsburgh & Lake Erie as assistant chief engineer, which position he held until March, 1920, when he was appointed chief engineer. In July, 1926, he was appointed assistant vice-president in addition to chief engineer, the positions he held until his death.





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Naturally the condition of the cylinders has a vital bearing upon the net profits. Every leak and blow reduces efficiency and increases the consumption of fuel per ton mile.

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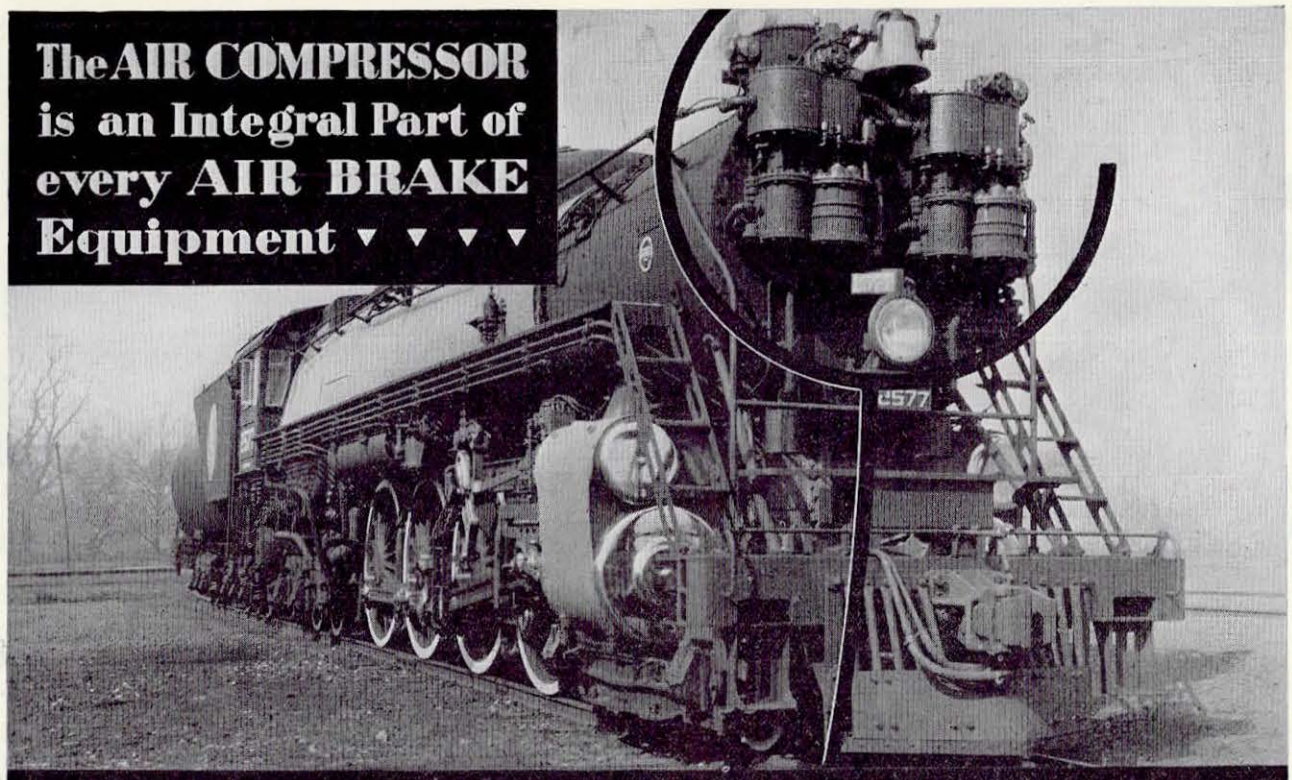
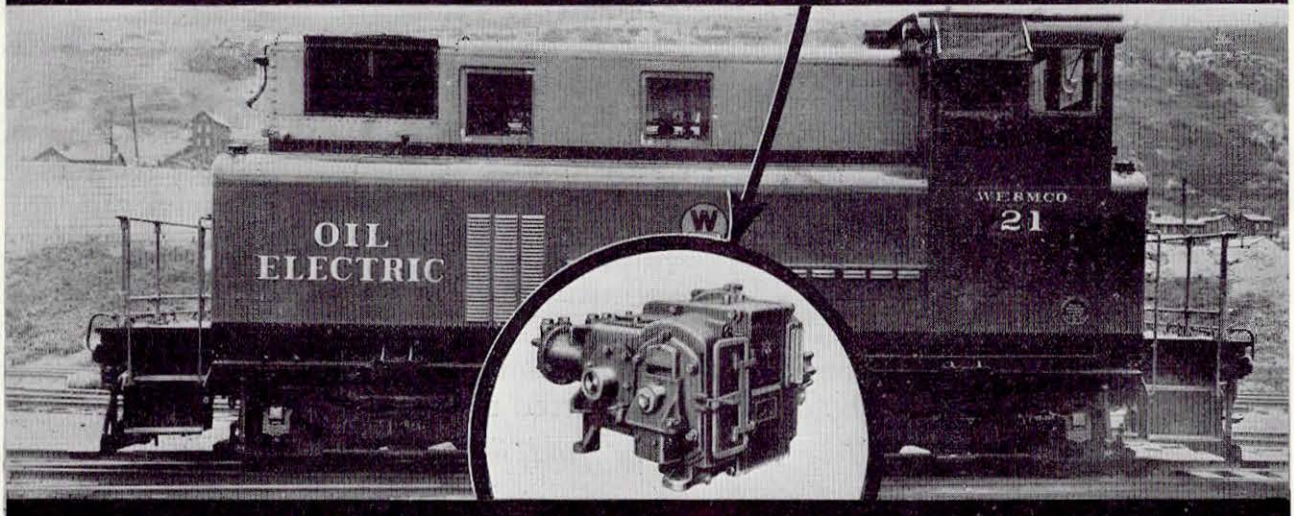
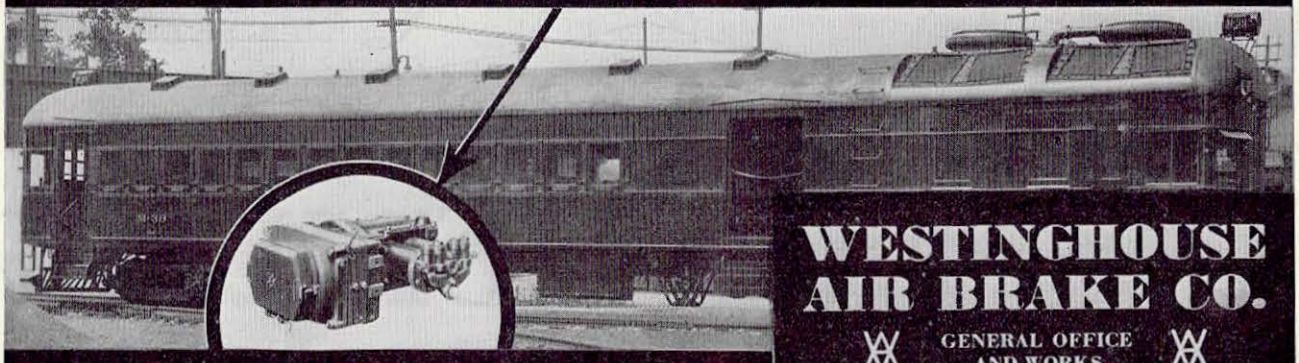


FOR STEAM LOCOMOTIVES



FOR ELECTRIC LOCOMOTIVES



FOR RAIL MOTOR CARS

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GENERAL OFFICE AND WORKS

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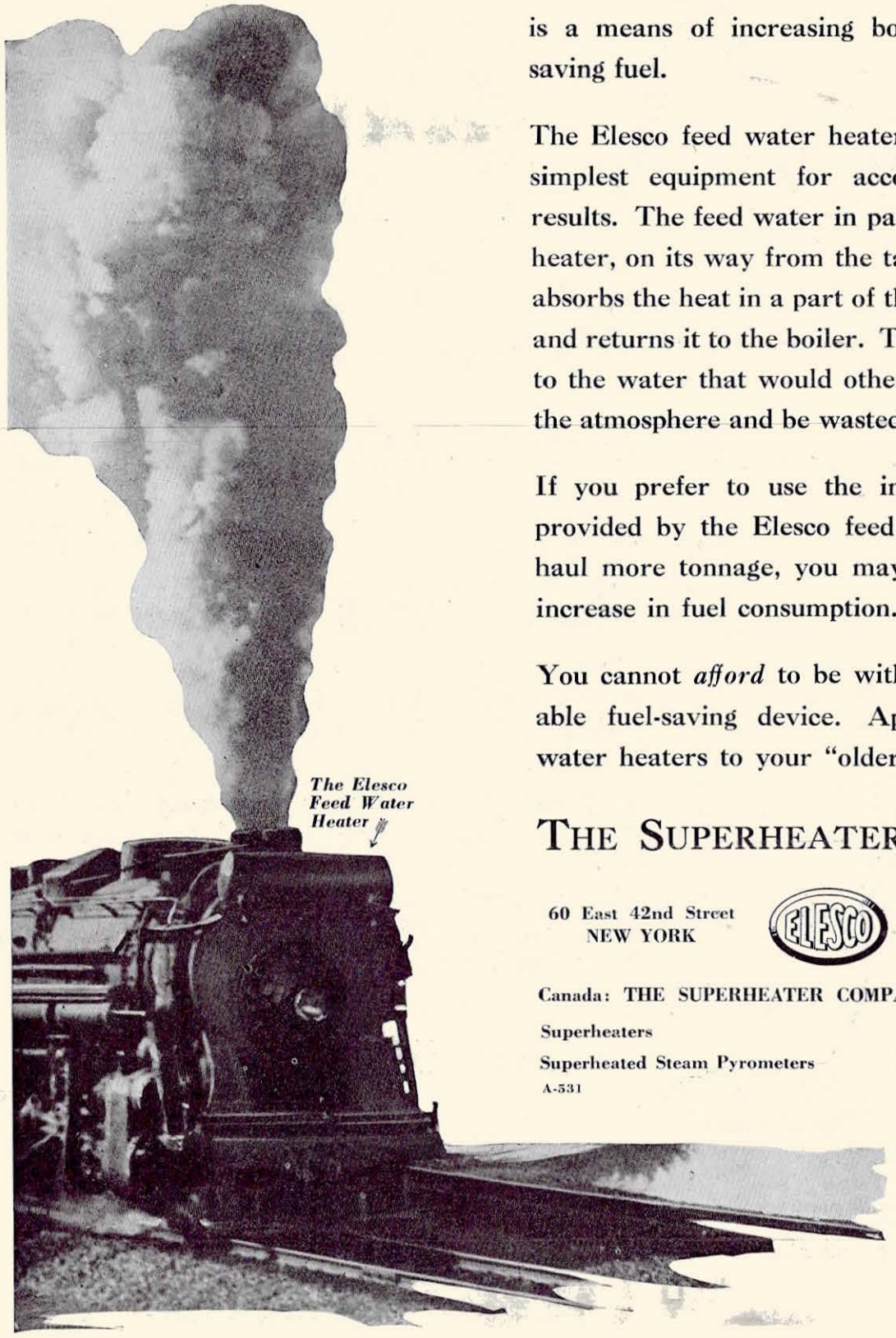
Reclaiming WASTE HEAT from the Exhaust Steam



is a means of increasing boiler capacity or saving fuel.

The Elesco feed water heater is the best and simplest equipment for accomplishing these results. The feed water in passing through the heater, on its way from the tank to the boiler, absorbs the heat in a part of the exhaust steam, and returns it to the boiler. Thus heat is added to the water that would otherwise pass out to the atmosphere and be wasted.

If you prefer to use the increased capacity provided by the Elesco feed water heater to haul more tonnage, you may do so—with no increase in fuel consumption.

You cannot *afford* to be without such a valuable fuel-saving device. Apply Elesco feed water heaters to your "older" power—now.

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Superheated Steam Pyrometers
Feed Water Heaters
Exhaust Steam Injectors

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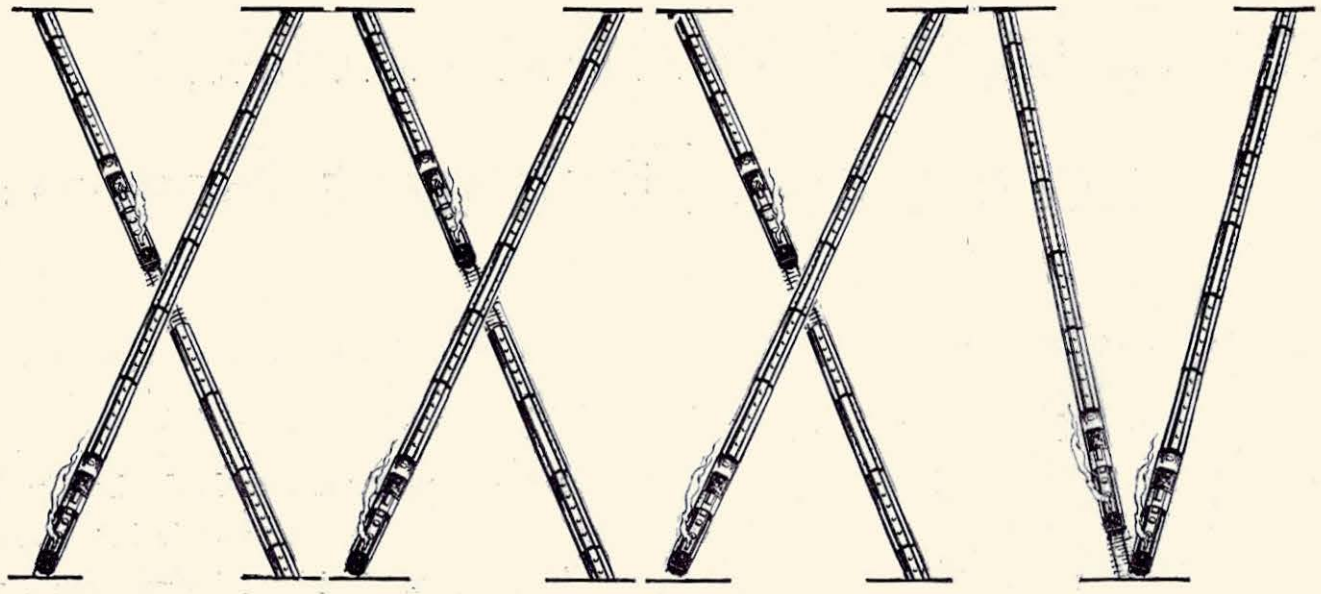
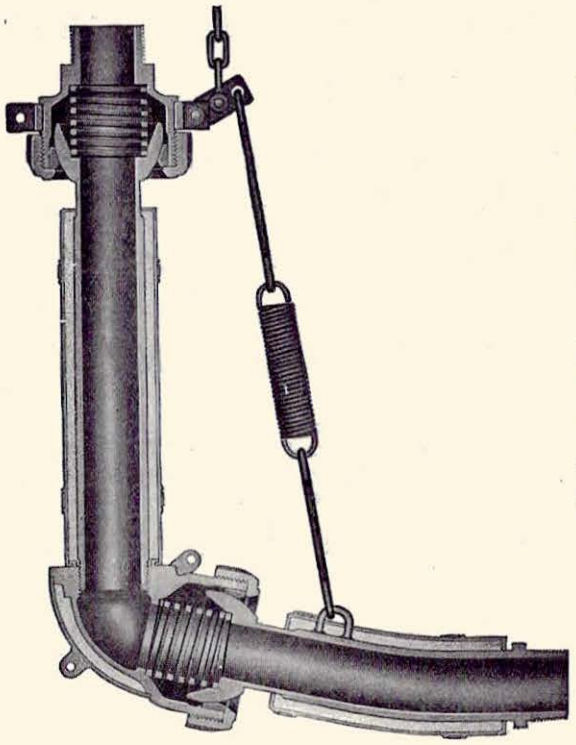


Railroads

Now Using BARCO Passenger Car Steam Heat Connections



Cross-section showing improved design and construction, also method of insulating Barco Steam-Heat Connections

BARCO Steam Heat Connections *save steam* because they have full capacity in all positions with all 90° bends eliminated and are completely insulated.

They *save trouble* because they carry full steam pressure without leaking—the gaskets cannot blow out.

They save *maintenance costs* because their all steel construction permits repairs in case of accident and the gaskets last at least a year between renewals.

Is your road among the 35?

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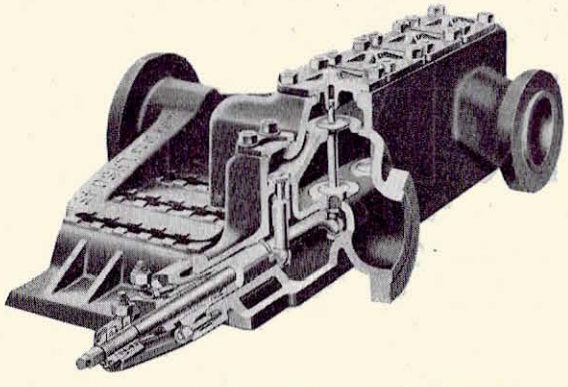
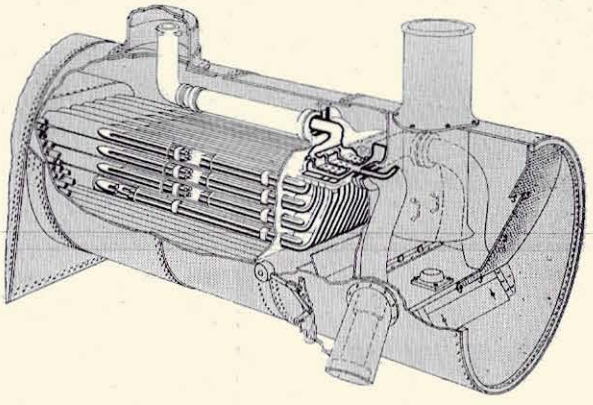
BARCO

Additional Steam Space Is *Provided...*

with the American multiple throttle. Being built integral with the superheater header, the dry pipe and the superheater units contain steam at all times—a fact of vital importance. This means that steam flows directly to the cylinders when the throttle is opened—a shorter path for the steam—reduced pressure drop—a quicker acting throttle.



Amer.can Multiple Throttle Combined with Elesco Superheater Header



But this is only one advantage of the American multiple throttle. Ease of application....ease of maintenance ....the use of superheated steam for the auxiliaries....all these are features of this throttle.

Why not install American multiple throttles in your older locomotives in need of heavy throttle repairs, or those with restricted steam space?

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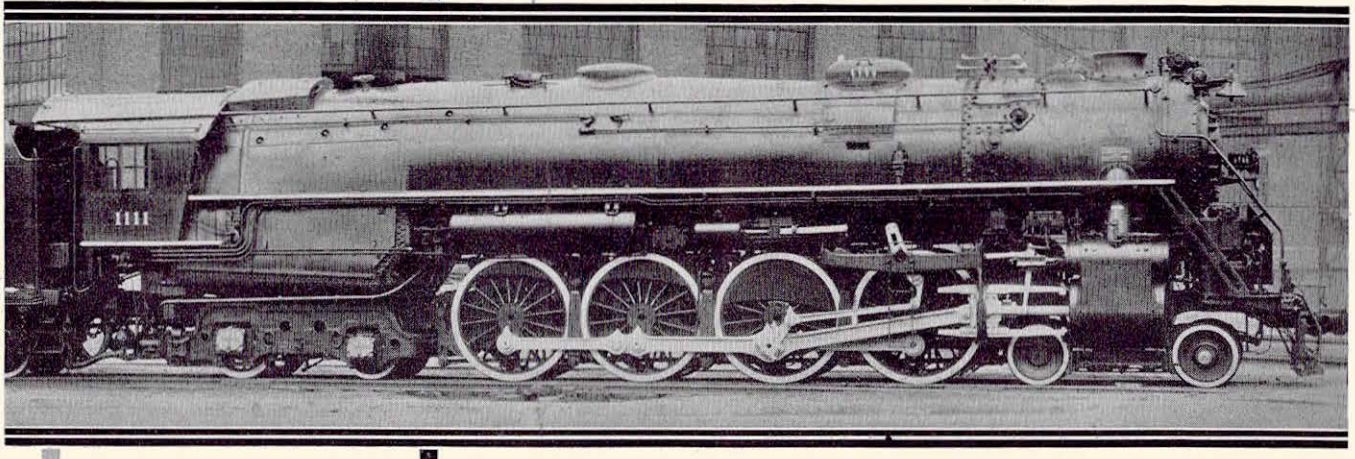

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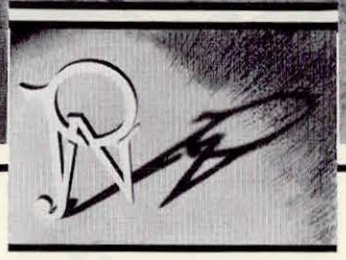
	MINIMUM PHYSICAL SPECIFICATIONS	AVERAGE 200 TESTS
Tensile Strength, lbs. per sq. in.	90,000	96,340
Yield Point, lbs. per sq. in.	60,000	64,900
Elongation, in 2", per cent.	25.0	27.8
Reduction in Area, per cent	50.0	55.0

UNION STEEL CASTING CO.

PITTSBURGH, PA.

THE LOS ANGELES LIMITED

Photo courtesy the Union Pacific System



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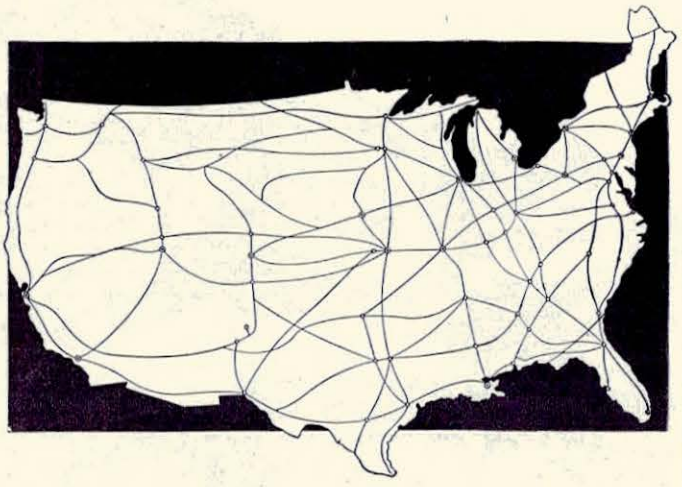

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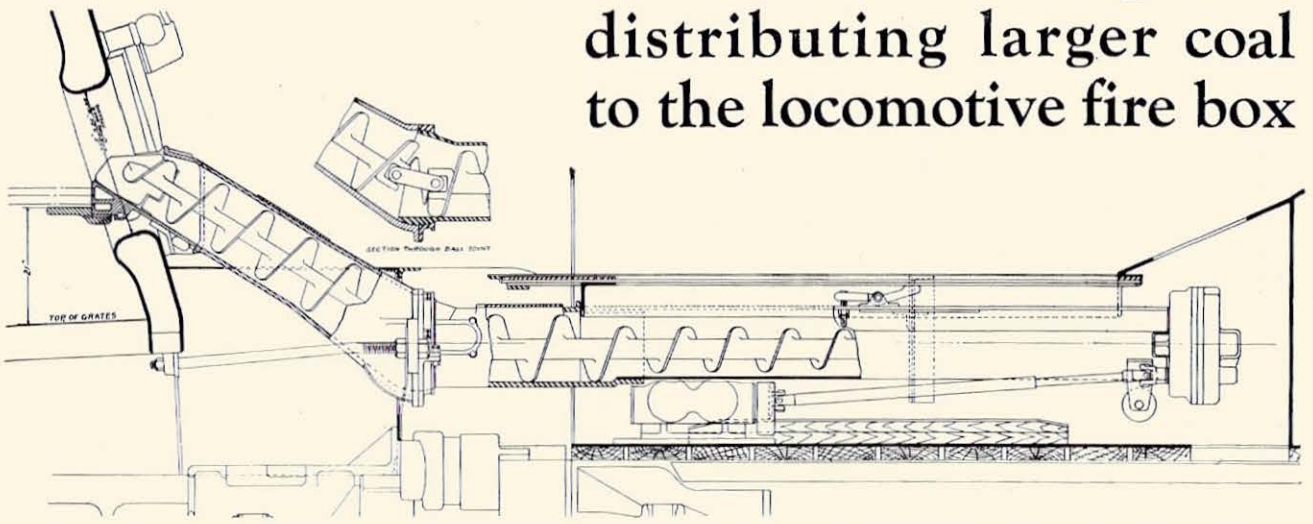
in active service are proving the economy of the LOWER SYSTEM of delivering and distributing larger coal to the locomotive fire box



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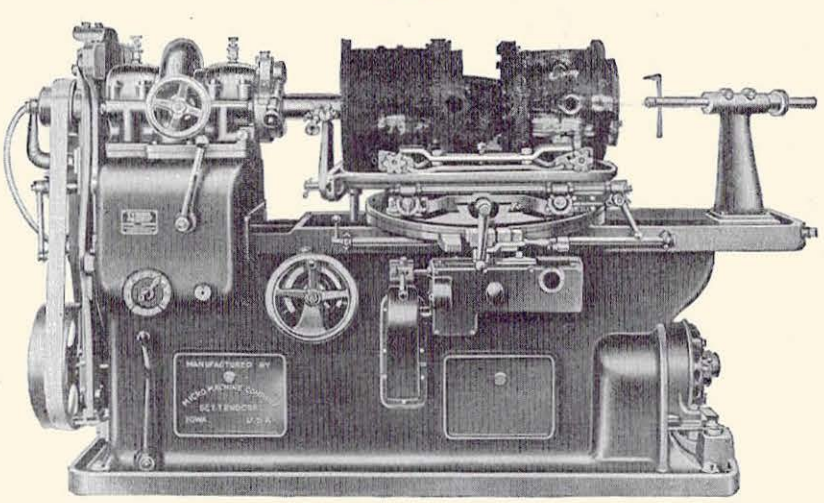

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No longer is there occasion to disassemble locomotive air pumps for cylinder reconditioning. MICRO Internal Grinders have eliminated that time-consuming process and the subsequent difficulties encountered in attaining perfect alignment when the pump is reassembled.

With MICRO Internal Grinders you are equipped to grind all types of air pumps assembled—and to do the job with unequalled speed, economy and accuracy. Air pumps ground "The Micro Way" are always in alignment, and their superior finish and accuracy further insure high efficiency performance and long service.

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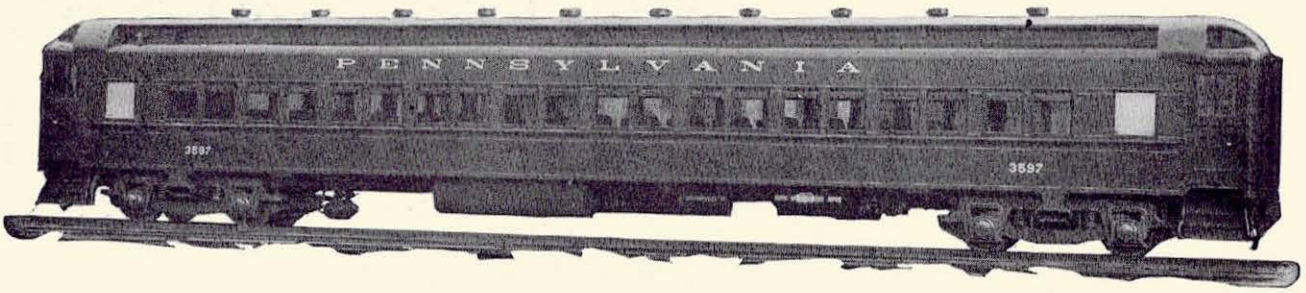

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Since 1897 this remarkable material has been lowering the cost of maintenance by added years of wear.

AGASOTE HEADLININGS

The only headlining made in one piece and which possesses the desirable qualities of wood and steel without their defects. Will not separate, warp or blister and is completely waterproof.

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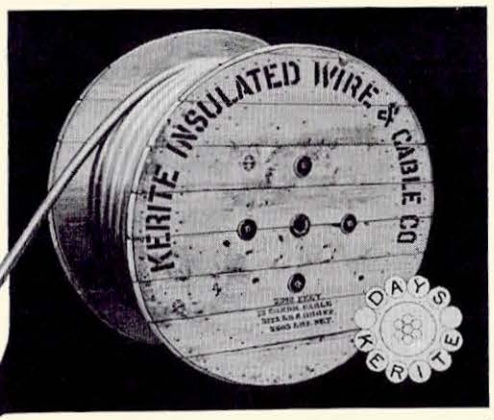

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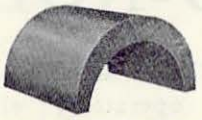
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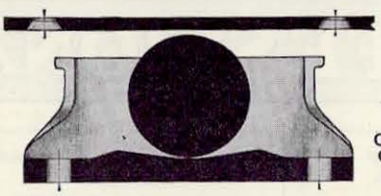

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Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co., The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The.
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Machine Co.
General Steel Castings Corp.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The.
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Philip, The.

Center Plates—(See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain, Monel Metal.
International Nickel Co., The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.
Dearborn Chemical Co.

Chemicals, Cleaning.
Oakite Products, Inc.

Chemists.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Forging.
Ryerson & Son, Jos. T.

Clamps, Guard Rail.
O. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Aircraft.
Oakite Products, Inc.

Cleaners, Air Pump.
Oakite Products, Inc.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Oakite Products, Inc.

Cleaners, Car.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Oakite Products, Inc.

Cleaners, Locomotive.
Oakite Products, Inc.

Cleaners, Metal.
Oakite Products, Inc.

Clips, Wire Rope.
American Steel & Wire Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, SecondHand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
FairbanksMorse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co., The.

Columns, Water.
Prime Manufacturing Co., The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp.

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The.

Compounds, Cleaning.
Oakite Products, Inc.

Compounds, Cutting.
Oakite Products, Inc.

Compounds, Grinding.
Oakite Products, Inc.

Compounds, Paint Removing.
Oakite Products, Inc.

Compounds, Rust Proofing.
Oakite Products, Inc.

Compressors, Air.
Ingersoll-Rand Co.
New York Air Brake Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Son, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Heating & Lighting Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Diesel.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Grab Bucket.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks.
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts, Corrugated Iron
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Part Circle
Armco Culvert Manufacturers Association

Culverts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
New York Air Brake Co.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtains & Fixtures, Car Window.
Pantasote Co., Inc., The.

Curtain Material, Car.
Pantasote Co., Inc., The.
Ryerson & Son, Jos. T.

Curtains, Cab.
Lehon Co., The.

Cutting and Welding Apparatus.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.

Cylinder Parts, Finished and Rough.
Locomotive Finished Material Co.
National Tube Co.
Valve Pilot Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.
Union Steel Casting Co.

Cylinders, Locomotive.
Locomotive Finished Material Co.

Cylinders, Oxy-Acetylene.
Oxweld Railroad Co., The.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
New York Air Brake Co.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Machine Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The

Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos—(See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electric Cables.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic. Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec., Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Coffin, Jr., Co., The J. S.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Electro Metallurgical Sales Corp.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
New York Air Brake Co.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works.

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg. Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Company

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Bethlehem Steel Co.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works, The.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.

Furnaces, Rivet Heating—(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America

Gage Testers—(See Testers, Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Car Lighting.
Safety Car Heating & Lighting Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.
Ryerson & Son, Inc., Joseph T.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The.
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door—(See Fixtures, Car Door).

Headgates, Sliding
Armco Culvert Manufacturers Association

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlining.
Pantasote Co., Inc., The.

Heaters, Electric.
Gold Car Heating & Lighting Co.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Safety Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
Safety Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & So., Jos. T.

Hoists, Electric.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
JohnsManville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Jacking, Locomotive.
Carey Co., Philip, The.

Jacking Method of Installing Pipe
Armco Cuvert Manufacturers Association

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal
Armco Railroad Sales Co.

Lathes, Axle.
Sellers & Co., Inc., Wm

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.
Safety Car Htg. & Ltg. Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.
Safety Car Htg. & Ltg. Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The.
Sunbeam Electric Mfg. Co

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks)

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.

Locomotives, Gas-Electric.
Brill Co., The J. G.
Electro-Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb Co., Geo. D. The.

Locomotives, Rebuilt.
American Locomotive Co.

Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotive Stokers.
Standard Stoker Co.

Locomotive Valve Pilot.
Valve Pilot Co.

Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.

Lubricators, Piston Rod.
Q & C Co., The.

Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lumber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Machine Screws, Monel Metal
International Nickel Co., The.

Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.

Mechanical Draft Apparatus—(See Heating and Vent. App.).

Mechanical Stokers.
Standard Stoker Co.

Melters, Snow, Electric.
Q & C Co., The.

Metallic Flexible Conduit.
General Electric Supply Corp.

Meters, Water & Oil.
Worthington Pump & Machinery Corp.

Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.

Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.

Milling Machines, Portable Frame Jaw.
Micro Machine Co.

Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Molybdenum Metal.
Vanadium Corp. of America.

Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.

Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg Co.

Motors & Generators.
Fairbanks-Morse & Co.

Moulding.
Alumi[illegible]Co. of America.

Multiple[illegible]elt Drives.
Wort[illegible]n Pump & Machi[illegible] Corp.

Nails.
Ameri[illegible]an Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Nipples, Air Hose.
Prime Manufacturing Co.

Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.

Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.

Nuts—(See Bolts and Nuts).

Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.

Nuts, Tank Hose.
Prime Manufacturing Co., The.

Office Appliances.
Remington-Rand Business Service

Oils, Diesel Engine
Vacuum Oil Co.

Oil, Dynamo
Vacuum Oil Co.

Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp

Oils & Greases, Engine
Vacuum Oil Co.

Oils & Greases, Lubricating
Vacuum Oil Co.

Oils & Greases, Motor
Vacuum Oil Co.

Oil, Linseed.
National Lead Co.

Oils, Locomotive Valve
Vacuum Oil Co.

Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.

Oil, Turbine
Vacuum Oil Co.

Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.

Oxygen.
Oxweld Railroad Service Co., The.

Packing.
Westinghouse Air Brake Co.

Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.

Packing, Asbestos.

Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Locomotive Finished Material Co.
Westinghouse Air Brake Co.

Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Ring Boiler.
Union Asbestos & Rubber Co.

Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.

Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.

Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.

Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.

Paint, Powder.
Aluminum Co. of America

Paint Spraying Equipment.
De Vilbiss Mfg. Co., The.

Paints.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.

Paper, Carbon.
Remington-Rand Business Service.

Paper, Sheathing.
Carey & Co., Philip, The.

Patterns, for Iron, Steel & Brass Castings.
Baldwin Locomotive Works, The.

Pavement Breakers.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pickling Equipment, Monel Metal.
International Nickel Co., The.

Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.
Inland Steel Company

Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The.

Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.

Pins, Air Brake & Clevis.
Champion Rivet Co.

Pins, Center.
Miner, W. H.

Pins, Coupler Knuckle.
Champion Rivet Co.
McConway & Torley Co.
National Malleable & Steel Castings Co.

Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.

Pipe, Corrugated Iron
Armco Culvert Manufacturers Association

Pipe, Paved Invert
Armco Culvert Manufacturers Association

Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.
Keasby & Mattison Co.

Pipe Fittings—(See Fittings, Pipe).

Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.

Pipe, Perforated Iron
Armco Culvert Manufacturers Association

Pipe, Spiral Welded.
Armco Railroad Sales Co.

Pipe, Steel Signal.
National Tube Co.

Pipe, Spiral Welded.
Armco Railroad Sales Co.

Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.

Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.

Plates.
Steel Car Forge Co.

Plates, Follower.
Steel Car Forge Co.

Plates, Boiler, Firebox—(See Steel Firebox).

Plates, Center—(See Bearings, Center).

Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Plate & Sheet Metal Work.
Baldwin Locomotive Works, The.

Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.

Plates, Tin and Terne.
American Sheet & Tin Plate Co.

Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.

Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.

Plows, Railroad and Grading.
Western Wheeled Scraper Co.

Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Q & C Co., The.

Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Pneumatic Tools.
Ingersoll-Rand Co.

Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Union Switch & Signal Co.

Poles, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.

Posts, Fence, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.

Powder, Blasting—(See Explosives).

Powdered Coal Equipment.
Muhlfeld, John E.

Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Power Transmission Supplies.
Sellers & Co., Inc., Wm.

Preservatives, Wood.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co.

Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.
Sellers & Co., Inc., Wm

Pulverizers, Coal — (See Crushers, Coal).

Pumping Stations.
Fairbanks-Morse & Co.

Pump Liners, Monel Metal.
International Nickel Co., The.

Pump Rods, Monel Metal.
International Nickel Co., The.

Pump Shafts, Monel Metal.
International Nickel Co., The.

Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Punching and Shearing Machines.
Ryerson & Son, Joseph T.

Pushers, Coal.
Standard Stoker Co.

Pyrometers, Superheated Steam.
Superheater Co., The.

Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.

Rail-Bonds.
American Steel & Wire Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Rail Braces — (See Braces, Rail).

Rail Reclamation Equipment.
Ryerson & Son, Joseph T.

Railroad Shops.
United Engineers & Constructors, Inc.

Rail Splice Plates — (See Joints, Rail).

Railroad Structures — (See Engineers and Contractors; also Building).

Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.

Railway Signals.
General Electric Supply Corp.

Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.

Recorders, Speed & Cut-off.
Valve Pilot Co.

Rectifiers for Signal Work.
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.

Reducing Valves.
Vapor Car Heating Co., Inc.

Reflectors, Headlight.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Refrigerators.
Wine Railway Appliance Co.

Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Rivet Cutters.
Ingersoll-Rand Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co.

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).
Tuco Products Corp.
Union Metal Products Co.

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp.
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Building, Special Car, Corrugated & Plain.
Armco Railroad Sales Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated & Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Sheets, Polished or Planished Iron.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.

Sheets, Steel.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication).

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
Industrial Brownhoist Corp.

Shovels, Steam, Gasoline & Electric.
Orton Crane & Shovel Co.

Siding, Iron & Steel.
Armco Railroad Sales Co.

Siding., Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co.

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.
Railroad Supply Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Sign Posts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Signs, Highway Crossing.
Railroad Supply Co.

Silico Manganese.
Vanadium Corp. of America.

Slabs, Concrete Floor.
Federal Cement Tile Co.

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Tubes, Boiler.
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Bethlehem Steel Co.
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Tubes, Boiler, Charcoal Iron.
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Reading Iron Co.

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Valves, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Valves, Piston.
Franklin Railway Supply Co., Inc.

Valves, Pop, Safety & Relief.
Ashton Valve Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Valves, Pressure Regulating.
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Valves, Throttle.
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Vapor Car Heating Co., Inc.
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Water Purifying Materials & Compounds.
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Gould Coupler Co.
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Standard Steel Works Co.
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American Steel Foundries.
Baldwin Locomotive Works, The.
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Edgewater Steel Co.
Griffin Wheel Co.
Illinois Steel Co.
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Pressed Steel Car Co.
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Mt. Vernon Car Mfg. Co.
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Wire Rope.
American Steel & Wire Co.

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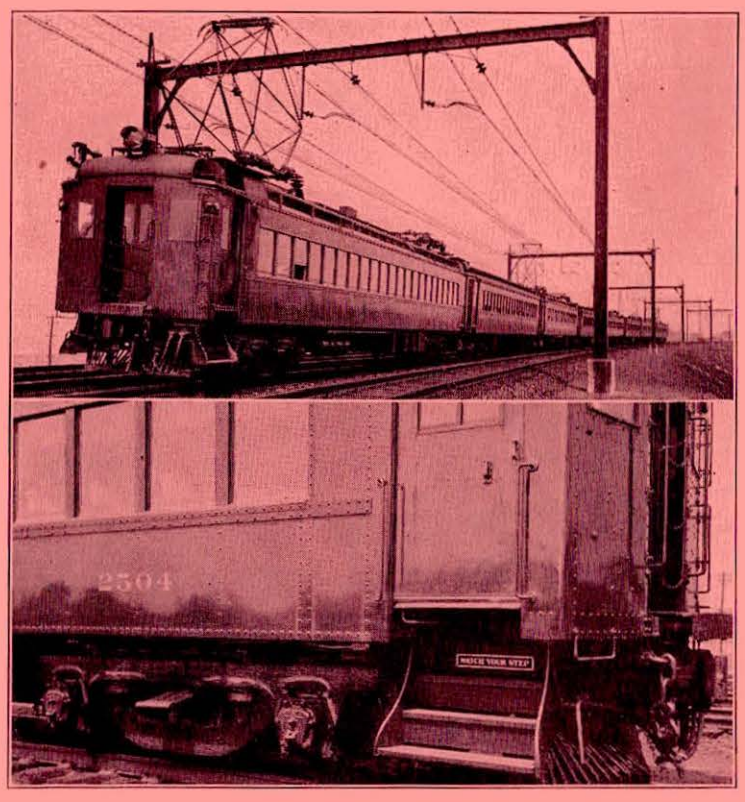
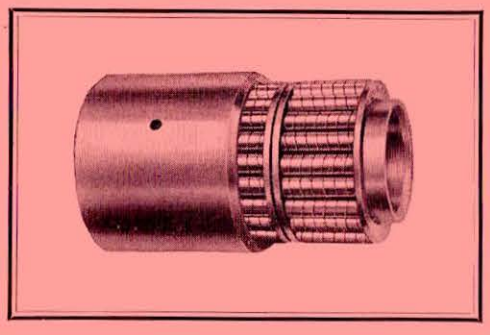


136 Trains a Day On the Lackawanna — On Hyatts



Electrified suburban trains on the Lackawanna—136 of them every day—have Hyatt equipped motor cars.

Ever since the Lackawanna electrified, Hyatts have served in its suburban service and prior to that for several years on some of its regular passenger cars.

Back and forth, day after day, in these 136 trains are 136 Hyatt equipped motor cars operating, without a moment's delay for hot boxes or any other bearing difficulty. This is a record that can be pointed to with pride.

This same kind of a dependable bearing preformance rendered by Hyatts on the Lackawanna and more than 75 other roads is available for your cars. Is there any bearing information we can furnish for your particular requirements? Hyatt Roller Bearing Company, Newark, Detroit, Chicago, Pittsburgh, Oakland.

HYATT
ROLLER BEARINGS
PRODUCT OF GENERAL MOTORS

AN ECONOMIC ACHIEVEMENT!

The marked improvement in freight train performance on one of our leading railways is shown in the following table:

	1929	1923	Per cent Inc.	Per cent Dec.
Gross ton-miles	115,596,000,000	106,300,000,000	9	..
Freight train-miles	48,947,000	59,894,000	..	18
Freight train-hours	4,112,000	6,390,000	..	36
Gross tons per train	2,362	1,775	33	..
Average train speed	11.9	9.4	27	..
Gross ton-miles per train-hour	28,110	16,636	69	..
Cost per 1000 gross ton-miles*	$0.547	$0.794	..	31

* The cost per 1000 gross ton-miles includes road freight wages, fuel, supplies and enginehouse expenses.

Due to the improvement in freight train operation, 1929 over 1923, there was a saving of 24.7 cents per thousand gross ton-miles. On the basis of the gross ton-miles produced in 1929 (115,596,000,000), this amounts to a total saving of $28,552,000.

The road making this record increased the ratio of its automatic block signal mileage to total miles of road from 14 per cent in 1923 to 26 per cent in 1929.

This improvement in signal efficiency made a large contribution to the improvement in freight train performance.

▼ ▼ ▼

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

74a

Signals Aid Modern Motive Power to Produce More Ton-Miles Per Train-Hour